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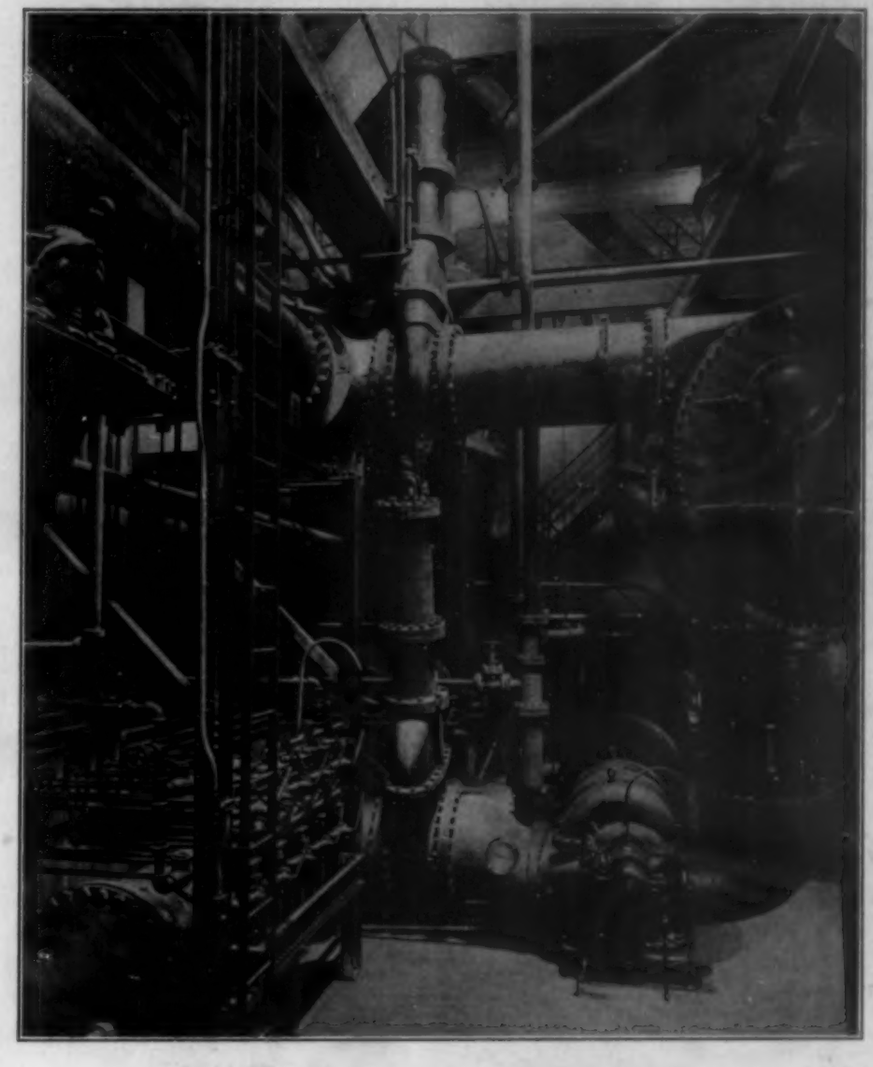

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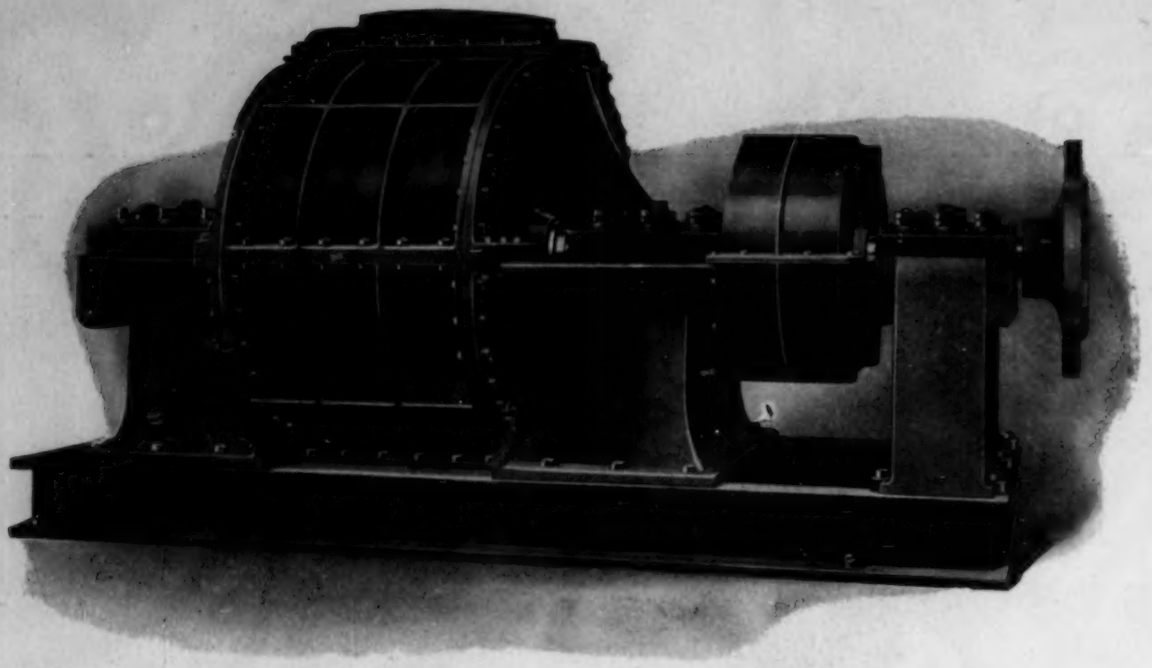

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THE IRON TRADE REVIEW

Vol. LIX Cleveland, October 5, 1916 No. 14

Pig Iron Orders Are Piled High

Southern Company Sells 100,000 Tons of Basic for Export—Heavy Buying of Steel Making Grades Followed by Price Advances

LEADING centers report a continuation of heavy buying of pig iron. All grades are represented, but the demand for steel-making irons is particularly strong and prices are advancing rapidly. In the Pittsburgh district, minimum quotations are $19.50 on basic, and $22.50 on bessemer, and further advances are expected at any time. Among the large basic tonnages recently placed are 60,000 by the Central Steel Co., Massillon, O., with a Cleveland furnace, 15,000 by the Republic Iron & Steel Co., about 25,000 by the Andrews Steel Co. and 10,000 by the Cambria Steel Co. In the Philadelphia market, transactions have amounted to more than 100,000 tons during the past few days and included an unusual tonnage of southern foundry irons. One southern company has sold 140,000 tons of various grades, including 100,000 tons of basic for export. The southern situation, as a whole, is much stronger, and higher prices have resulted from the improved demand. Active inquiry from J. P. Morgan & Co. and others for export continues. Orders recently placed by this New York firm for shipment to France and England are understood to have amounted to fully 60,000 tons of low phosphorus and bessemer grades. Italy, Holland, Norway and Sweden recently have been factors in the market.

Blast Furnace Production

Following the decline in pig iron production of about 25,000 tons in August, September shows a gain of 14,640 tons, the output for the month being 3,212,478 tons. The average daily production also shows a gain of 3,927 tons, and the gain of stacks in blast was eight.

Railroad Buying

The contract which has been entered into by American capitalists to build a railroad of 1,100 miles for the Chinese government, will call for from 100,000 to 125,000 tons of steel rails, which American mills will have a chance to book if they are able to give the delivery which will be required. Car buying in September amounted to 14,500 cars, which was the largest number of any month this year except January. Buying of rails has been light.

Iron Ore

The vessels of the Great Lakes continue to make a wonderful record. The shipments for September amounted to 9,600,786 tons, making the total movement to Oct. 1, 48,816,650 tons, an increase of 14,146,084 tons over 1915, and indicating that 62,000,000 tons can be shipped during the season without difficulty. This situation removes all anxiety that may have existed as to possible shortage of ore.

Bars

The demand for steel bars continues extremely strong from all consumers except automobile manufacturers, who, in some cases, have cancelled considerable tonnages. While various explanations, more or less plausible, are offered, it is evident that buyers are not as active as they were some time ago.

Plates

One large eastern platemaker has booked orders amounting to from 50,000 to 60,000 tons of plates, mostly for new ships. Pittsburgh plate requirements for 20,000 cars are being figured on. The American Car & Foundry Co. and other important buyers have placed orders liberally.

Shapes

An order for 6,000 tons to replace the section of the Quebec bridge recently lost is soon to be placed and the steel will probably be furnished by the American Bridge Co. That company has booked 15,000 tons for the New York Central hotel in New York. The question of delivery is an important factor in many pending projects.

Naval Contracts

The first contracts in connection with the very extensive naval program of the government have been awarded, the Carnegie Steel getting 9,000 tons of steel for hospital and fuel ships, delivery to be in 300 days.

THE OPEN HEARTH

Deplorable Practices

CONDITIONS highly humiliating to the honorable business men of this country have developed in connection with the efforts made during the past two years to extend trade of the United States to the republics of Central and South America. The Union Industrial Argentina, an organization of leading business men of the Argentine republic, has transmitted to the American consul general at Buenos Aires, N. Henry Robertson, a dignified and reasonable statement, setting forth that its board of directors for some time past has been receiving frequent complaints from members of the association of failure on the part of United States firms to comply with contracts entered into. The members allege that the terms of the contract are not complied with as to the quality and quantity of the goods, and that claims are seldom attended to as they should be, especially in the many instances in which payments are made in advance.

The Americas, published by the National City Bank of New York, publishes in considerable detail statements as to various transactions concerning which Argentine merchants have made complaint and a strong *prima facie* case is presented of not only rank carelessness in some cases, but also of deliberate fraud in others. In commenting upon the complaints, *The Americas* says that "In our domestic markets, custom has sanctioned a great volume of countermanding of business commitments in some lines. A man goes energetically after business, obtains more than he can handle and is not held drastically to terms. Rapid communications and easy supplies make our merchants reasonable. When a man takes an order in foreign trade and backs out, however, he causes his customer definite loss. An exporter is expected to pay for his mistakes of foresight and make good his promises even at a loss. Argentine merchants have been more or less reasonable in consideration of abnormal conditions. Our merchants sometimes find it hard to conceive of the business necessity of taking a loss on an order. Scores of such disputes have been adjusted."

In many cases, doubtless, adjustments have been made in a manner very creditable to sellers from the United States, but the fact that disputes continue to arise is highly unfavorable to the building up of a substantial trade with the republics of South America. We are glad to be able to say that we have seen no complaint concerning any transactions in iron and steel products. The iron trade certainly has not insisted upon the faithful carrying out of contracts in this country as it ought to have done, but evidently in other lines of manufacturing the tendency to regard contracts as mere "scraps of paper" has been more pronounced than in the iron trade and the extension of loose methods to foreign lands is highly deplorable. No matter how reprehensible may be practices of some business men of other countries, it behooves the citizens of the United States to do their utmost to fulfill all contracts in such a way that there will be absolutely no reason for just complaint.

Save a Billion Dollars---How?

HENRY FORD, of Detroit, pacifist and enemy of Wall street, in taking up the cudgels against the railroads, promises to surpass Mr. Brandeis in making suggestions as to how they shall conduct their business. In a recent interview, he is quoted as saying, "If the roads were run to serve the public, run more by the men who really have to operate them, run as railroad properties and not as mere instruments of financial juggling, we could have lower rates, better service, higher wages and still leave a profit for every dollar legitimately invested. The roads could make double the profits at present rate of fares and pay all increases of wages demanded."

Frank Trumbull, chairman of the railway executives' advisory committee, has pointed out that virtually all the expenses of the railroad are made up of labor and material, and he remarks that Mr. Ford will earn the gratitude of a hundred million people if he will show how the railroads could double their profits. "How would you save a billion dollars?" modestly inquires Mr. Trumbull. "Out of which items would you take it?" Up to date, Mr. Ford has not filed his reply. It will be awaited with interest.

The Field of Reconstruction

THE machine tool market during April, May and June was characterized by an unusual number of inquiries for large-swing lathes capable of turning heavy shells. It is believed that this feature was caused by the extensive preparations which preceded the offensive movement inaugurated by the allied powers. This increased activity in heavy machines has fallen off sharply during the past three months. In fact, the lathe inquiries before the trade during September were said to be materially less than any month during the year.

Does this slackening presage a general let up in the machine tool industry? It is the consensus of opinion of the largest builders that all indications are to the contrary and that the present apparent diminishing of foreign orders is not to be taken very seriously. For the time being, it is possible that the foreign governments have sup-

THE OPEN HEARTH

plied their needs, but to intimate that the stupendous business which has been consummated in this country by foreign powers is not to be followed by further buying, is not justified.

In speaking before an illustrious body of men a few weeks ago, the vice president of a well known machine tool concern gave a most optimistic view of the present situation, and of the future. He pointed out that the possibilities were as follows: That if the allied powers succeed in forcing Germany back to her own borders, the territory now held by the German armies would be laid waste for military reasons; that the recovered territory must obviously continue in that condition until peace has been declared.

The great field of the future, it was pointed out, did not depend upon the continuation of hostilities, but upon the rebuilding of the internal commercial sinews of war-impoverished nations.

American Genius to the Fore

IF ANY proof were needed to show whether American chemists and chemical engineers are solving the problems of meeting essential domestic requirements which were thrust upon them precipitately by the shutting off by the war of imports from the great chemical-producing nations of Europe, especially Germany, a conclusive answer was supplied by the large gathering of American scientists affiliated with the chemical industry at New York last week. In the meetings of the American Chemical Society and of the American Electrochemical Society, there was clearly manifest from the formal papers and discussions, a seriousness of purpose and thoroughness of effort which bespeak a broad and permanent future for the manufacture of chemical products in this country. It was shown that numerous products which had not been made in this country at all before the war, or only in a small or moderate way, now are being manufactured successfully and on a rising scale both as to quality and quantity. The visual demonstration of these accomplishments was given in the extensive exposition of the chemical industries of the country which was held in connection with the scientific sessions. It is of especial gratification that the iron and steel industry is performing a big service in this development in providing large quantities of by-products for the chemical manufacturer to transform into the needs of domestic and industrial life.

The American chemical industry has met with many difficult obstacles during the past two years in gaining the high ground upon which it now is progressing and there are many additional questions to be solved before its permanency and strength are assured. One of these is the need of liberal legislative support; another is the development of a personnel which, in numbers and skill, shall be commensurate with the growing importance of the industry. Many colleges and universities have sensed their duty and opportunity alike in this latter regard and are providing the essential training without which this stimulated branch of industry cannot reach its full expansion. There is room for a much greater movement along this line.

The most important aspect of the rejuvenated chemical industry from a national standpoint is that advanced efficiency and conservatism in productive effort are embodied in its activities. It is further linking the country's national resources with its industrial pursuits, imparting the strength of independent domestic supply in many essential articles of peace and war and a new spirit of thoroughness and thrift to manufacturing enterprises.

Poverty and Prosperity

POVERTY does not disappear entirely, even in the times of greatest prosperity. This is a fact which many people find difficult to understand and charity workers complain that in this year of great prosperity they are finding it no small task to collect the funds necessary to take care of those who really are deserving of assistance.

Various unusual elements enter into the present situation. One of these is the scarcity of houses. This is due not only to a large increase in the number of people living in busy manufacturing cities, but also to the fact that in some centers many small houses have been torn down in order to make room for manufacturing plants. Rents have advanced and evictions have taken place with unusual frequency, and often with little excuse. The poor find it increasingly difficult to obtain places of abode at reasonable rents and charitable organizations which are compelled to pay rents for the indigents find the amounts unusually large. Desertions, be it said to the disgrace of humanity, are more frequent than usual, for unprincipled men can easily find pretexts for going from one town to another, leaving behind families to be cared for by charitable organizations. Sickness continues in spite of prosperity and especially in treatment of tuberculosis, good, nourishing food must be provided. This costs more than it did a year ago.

All things considered, the appeal of charity is particularly worthy of attention at the present time on the part of those who are enjoying large profits. As the winter approaches, the demand is certain to become more urgent, whether prosperity continues or not.

Pig Iron Production Shows Increase

September Output of Country's Blast Furnaces Exceeds Any Month Since June—Number of Active Stacks Increases by Eight, First Important Gain in Several Months

PIG iron production in September was at the highest rate of any month since June. More favorable weather conditions, combined with a gain in the number of active stacks, placed the average daily production of pig iron in September at a higher level than during either July or August.

The total output of coke and anthracite pig iron in September was 3,212,478 tons, compared with 3,197,838 tons in August, a gain of 14,640 tons. Actually, however, the gain was much larger, owing to the fact that there was one less working day in September. This is shown in a comparison of the average daily output for the two months. The furnaces averaged daily during September 107,083 tons, against 103,156 tons in August, a gain of 3,927 tons.

The total output of non-merchant iron in September was 2,344,763 tons, a gain of 7,331 tons over August, when 2,337,432 tons were produced. The merchant furnaces produced 830,029 tons in September, against 821,823 tons in August, a gain of 8,206 tons. The steel works furnaces averaged daily during September, 78,139 tons, against 75,401 tons in August, a gain of 2,758 tons. The average daily output of merchant iron in September was 27,668 tons, against 26,510 in August, a gain of 1,158 tons.

There was a net gain of eight in the number of active furnaces, in marked contrast to conditions during the immediately preceding months, when a number of stacks were blown out for repairs and relining. On the last day of September, 325 furnaces were in blast, compared with 317 on the last day of August. Eight merchant furnaces were blown in and four blown out, while five non-merchant furnaces were relighted and one blown out.

The production of ferro in September was 24,586 tons, against 21,747 tons in August, a gain of 2,839 tons. Spiegel production in September was 13,100 tons, a loss of 3,736 tons from August, when 16,836 tons were produced.

The following merchant furnaces were blown in in September: Detroit "B", Detroit Iron & Steel Co., Sept. 6; Buffalo "A", Buffalo Union Furnace Co., Sept. 6; one Buckeye, Columbus Iron & Steel Co.; Hamilton, Hanging Rock Iron Co.; Cherry Valley, M. A. Hanna & Co., Sept. 27; Delaware River, Delaware River Steel Co.; Marshall, Juniata Furnace & Foundry Co., and Standard, Standard Iron Co. Those blown out were: Pioneer No. 2, Republic Iron & Steel Co., Sept. 1; one Palmerton, New Jersey Zinc Co., Sept. 13; one Lebanon, Bethlehem Steel Co., and Helen, Red River Furnace Co.

The steel works furnaces blown in were: Gary No. 6, Indiana Steel Co., Sept. 9; one Bellaire, Sept. 20, one Edgar Thomson, Sept. 12, and one Lucy, Sept. 20, Carnegie Steel Co., and one Eliza, Jones & Laughlin Steel Co. Emma furnace of the American Steel & Wire Co. was blown out.

AVERAGE DAILY PRODUCTION.

	1916.	1915.	1914.	1913.	1912.
Jan.	102,319	51,323	60,624	89,929	66,220
Feb.	106,157	59,521	67,450	92,095	72,372
Mar.	107,343	66,009	75,534	89,123	77,791
Apr.	107,517	70,484	75,383	91,812	79,254
May	108,535	72,747	67,646	90,865	80,753
June	107,127	78,998	63,486	87,229	81,125
July	103,907	82,687	63,075	82,525	77,502
Aug.	103,156	89,510	64,403	81,839	80,650
Sept.	107,083	94,478	62,757	83,137	81,482
Oct.	.....	100,656	57,007	81,933	86,569
Nov.	.....	101,174	50,042	74,322	87,985
Dec.	.....	103,278	48,236	63,746	89,590
Av'r'ge	105,888	81,022	62,934	83,980	80,124

MONTHLY PRODUCTION.

	1916.	1915.	1914.
January	3,171,878	1,591,024	1,879,336
February	3,078,548	1,666,592	1,888,607
March	3,327,630	2,046,280	2,341,551
April	3,225,496	2,114,518	2,261,501
May	3,364,584	2,255,157	2,097,019
June	3,213,818	2,369,932	1,904,566
Total 1st half.	19,381,954	12,043,503	12,372,580
July	3,221,127	2,563,311	1,955,324
August	3,197,838	2,774,825	1,996,483
September	3,212,478	2,834,342	1,882,718
Total 9 mos...	29,013,397	20,215,981	18,207,105
October	.....	3,120,340	1,767,227
November	.....	3,035,235	1,501,269
December	.....	3,201,605	1,495,325
Total 2d half.	.....	17,529,658	10,598,346
Grand total.	29,013,397	29,573,161	22,970,926

SEPTEMBER PIG IRON

States.	No. of stacks.	No. in blast last day of month.		Total tonnage made.		——Totals——	
		Sept.	Aug.	Merchant.	Non-Merchant.	Sept.	Aug.
Pennsylvania	154	132	129	256,369	1,074,537	1,330,906	1,309,206
Ohio	75	67	64	172,426	531,164	703,590	723,700
Alabama	45	28	29	134,832	84,067	218,899	218,810
Virginia	22	9	9	33,803	.....	33,803	35,620
New York	26	20	19	69,490	116,353	185,843	183,733
New Jersey	6	1	1	6,907	.....	6,907	7,020
Illinois	24	23	23	52,591	260,665	313,256	322,234
Colorado	6	4	4				
Indiana	10	10	9	29,406	222,680	252,086	238,630
Maryland	4	4	4				
Wisconsin	6	4	4				
Kentucky	7	3	3				
West Virginia	4	4	4	41,180	30,227	71,407	74,675
Tennessee	17	9	9				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	3	3	3	33,025	25,070	58,095	46,627
Michigan	3	3	2				
Missouri	1	1	1				
Spiegel—All states...						13,100	16,836
Ferro—All states....						24,586	21,747
Totals	419	325	317	830,029	2,344,763	3,212,478	3,197,838

Institute Program

Will Include Papers, Banquet and Seeing St. Louis.

New York, Oct. 3.—Announcement is made of the tentative program which will be presented at the eleventh general meeting of the American Iron and Steel Institute to be held at the Planters' Hotel, St. Louis, Friday and Saturday, Oct. 27 and 28. The presentation of the formal papers and addresses will be made as usual at the Friday morning and afternoon sessions. In the evening a banquet will be given at the club house of the Missouri Athletic Association. Saturday will be devoted to "Seeing St. Louis", for which an attractive program has been arranged.

The tentative list of papers and addresses to be presented at the meeting is as follows:

The president's address, Elbert H. Gary.

St. Louis and Its Industries, Clarence H. Howard, president, Business Men's League, St. Louis, Mo.

The Duplex Process, George B. Waterhouse, metallographist, Lackawanna Steel Co., Buffalo.

Pulverized Coal as a Fuel for Metallurgical Furnaces, James W. Fuller, president, Fuller Engineering Co., Allentown, Pa.

The Iron Ores of the Adirondack Region, Frank S. Witherbee, president, Witherbee, Sherman & Co., New York.

Progress in Hot Blast Stove Design, Arthur J. Boynton, superintendent, blast furnaces, the National Tube Co., Lorain, O.

Tool Market Fails to Equal Record

Business Concluded During September Represents Fair Total But Does Not Touch Previous Levels—Domestic Sales Maintain Steady Average and Counteract Effect of Sagging Foreign Inquiries

ACTIVITY in the machine tool market during September was confined for the most part to a miscellaneous demand from domestic consumers for single tools. Only a few large inquiries were noted and foreign buying particularly during the latter part of the month, fell off considerably. Comparatively speaking, the machine tool market was quiet during September.

The inability of consumers to get machines except for late delivery is regarded as one of the principal drawbacks to present business conditions. It is true that deliveries on small machines, such as 18 and 24-inch lathes, can be had for shipment within 30 to 90 days as compared to previous quotations of five and six months, but larger machines, for which there is a growing demand, are unobtainable. It is almost impossible to obtain milling machines, large lathes and grinders. Radial drills and drill presses are exceedingly scarce. In addition, the tendency toward higher prices is also acting as a damper. Eastern makers, however, have not as yet increased prices but several Ohio manufacturers recently announced an advance of 10 per cent on planers and shapers, effective Oct. 1.

Decreased Sales to Munition Plants

Buying on the part of munition plants has dropped off to a considerable degree and the orders placed call chiefly for large lathes. One development of interest is that scarcely a manufacturer in the country is now making foot-power lathes. This condition is due principally to the fact that prices have been prohibitive for this class of buyers, and as a result lathe makers now prefer to use their facilities for the manufacture of power-driven machines.

Carriers Purchase Moderately

As already indicated, the railroads and ship yards have been relatively small buyers. The Pennsylvania Lines West, however, have been negotiating for a good sized list of tools and are expected to close shortly. The Baltimore & Ohio railroad has purchased a number of hydraulic wheel presses, also several carwheel and driving-wheel lathes. The Cincinnati, New Orleans & Texas Pacific railroad has bought a few lathes and milling machines, and the Cleveland, Cincinnati, Chicago & St. Louis railroad also bought a few single tools.

Many Inquiries for Cranes

Buying of cranes has been limited to a few scattered sales. Inquiries appeared in fairly good volume, but the actual purchasing has been relatively small. Here again the long delivery clause has retarded buying. The Pennsylvania railroad purchased a gantry crane for its freight station at East Liberty, Pa.; the Union Drawn Steel Co., Beaver Falls, Pa., bought three cranes of five, 10 and 15-ton capacity for its proposed plant at Gary, Ind.; the Keystone Steel & Wire Co, Peoria, Ill., obtained one 40-ton crane; the American Steel & Wire Co., Worcester, Mass., purchased one 7½-ton crane and the Phillips Sheet & Tin Plate Co., Weirton, W. Va., one 3-ton crane. The United States government has placed an order with the McMyler Interstate Co., Bedford, O., for a locomotive crane, costing more than $11,000, for the Charleston navy yard, and has also announced that it will receive bids until Nov. 11 on a 250-ton pontoon crane for the Mare Island navy yard on the Pacific coast. This latter inquiry is regarded as the largest in the crane market at the present time, and is expected to involve more than $1,000,000. Included among the more important buyers of machine tools during the past month is the Carnegie Steel Co., which bought some coal handling equipment and a number of machine shop tools for its plant at Clairton, Pa.

Good Demand for Mill Equipment

Builders of rolling mill equipment reported a fairly good demand from both foreign and domestic sources. Russia, France, Japan, Italy and Spain have all made inquiries for blooming mill, plate mill and bar mill equipment, but owing to the time specifications little of this business was placed. The American Rolling Mill Co., Middletown, O., the Youngstown Iron & Steel Co., Youngstown, O., and the Donner Steel Co., Buffalo, which recently awarded contracts for additions to their mills, have been negotiating for crane and rolling mill equipment, and are expected to close shortly. Russia and France appeared to be the largest buyers during September, and it is understood that these countries closed principally on large lathes. The Canadian government also put out an inquiry for 50 30-inch turret lathes, but this order called for prompt delivery and consequently was refused.

Large Volume of Prospective Business

In some of the prospective business at the end of the month was a large list issued by the National Tube Co., Pittsburgh, for its Lorain, O., plant. This inquiry called for lathes, screw machines, boring mills, slotters and planers. The Cincinnati Planer Co., Cincinnati, is expected to appear in the market shortly for equipment for its proposed 40 x 200-foot addition. It is understood that the Bethlehem Steel Co., South Bethlehem, Pa., still has inquiries pending, and that the General Electric Co. has not yet covered on the tools for its plants at Schenectady, N. Y., and Fort Wayne, Ind., on which prices have long since been taken. The Crucible Steel Co. of America, Pittsburgh, is reported to be in the market for a 15-ton crane. Ship builders are expected to enter the market at most any time, especially in view of the large naval program for which an appropriation was recently made by congress.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products October 4, average for September, 1916, average for July, 1916, and average for October, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Oct. 4, 1916.	Aver. for Sept., 1916.	Average for July, 1916.	Aver. for Oct., 1915.
Bessemer pig iron, Pittsburgh	$23.45	$22.20	$21.95	$16.95
Basic pig iron, Pittsburgh	20.45	19.075	18.95	15.95
No. 2 Fdy. pig iron, Pittsburgh	20.45	19.50	19.45	15.57
Northern No. 2 Fdy., Chgo.	19.00	18.65	19.00	14.45
Lake Superior Charcoal, Chgo.	19.75	19.75	19.75	16.25
Malleable, Chgo.	19.00	19.15	19.50	15.12
Southern No. 2, Birmingham	14.50	14.38	14.00	11.75
Southern Ohio No. 2, Ironton	18.50	18.25	18.38	14.88
Basic, eastern Pa.	20.00	20.00	19.00	17.50
No. 2X Virginia furnace	17.50	17.50	18.50	14.00
No. 2X foundry, Philadelphia	20.00	19.75	19.75	16.50
Ferro mang., Balti.	164.00	164.00	172.50	105.00
Bessemer billets, Pbgh.	45.00	45.00	40.00	25.50
Bess. sheet bars, Pbgh.	45.00	45.00	40.00	25.50
Op.-h'th sh. bars, Pbgh.	45.00	45.00	40.00	26.50
Open-hearth billets, Pbgh.	45.00	45.00	40.00	26.50
Steel bars, Chgo.	3.10	2.79	2.69	1.59
Steel bars, Pittsburgh, contr.	2.60	2.60	2.50	1.41
Iron bars, Philadelphia	2.659	2.659	2.559	1.559
Iron bars, Cleveland, local del'y.	2.55	2.40	2.40	1.50

	Prices Oct. 4, 1916.	Aver. for Sept., 1916.	Average for July, 1916.	Aver. for Oct., 1915.
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.37
Beams, Chgo.	3.10	2.79	2.69	1.59
Beams, Pittsburgh, contr.	2.20	2.60	2.50	1.41
Beams, Philadelphia	2.859	2.759	2.659	1.609
Tank plates, Pbgh., contract	3.00	2.95	2.86	1.42
Tank plates, Chicago	3.50	3.19	3.09	1.55
Tank plates, Philadelphia	3.909	3.909	3.909	1.609
Sheets, blk., No. 28, Pbgh.	3.05	2.88	2.90	2.05
Sheets, blue an., No. 10, Pbgh.	3.00	2.92	3.00	1.00
Sheets, galv., No. 28, Pbgh.	4.35	4.225	4.37	3.50
Wire nails, Pittsburgh	2.60	2.60	2.50	1.76
Connellsville fur. coke, contr.	3.25	2.48	2.42	2.25
Connellsville fdy. coke, contr.	3.75	3.25	3.15	2.48
Heavy melting steel, Pbgh.	17.00	16.12	16.25	14.00
Heavy melting steel, east'n Pa.	15.00	15.00	15.25	15.00
Heavy melting steel, Chgo.	16.00	15.50	14.15	11.56
No. 1 wrought eastern Pa.	21.50	21.00	19.75	16.00
No. 1 wrought, Chgo.	17.00	16.65	13.95	10.68
Rerolling rails, Chgo.	17.75	16.90	15.70	13.25
Car wheels, Chgo.	12.00	12.00	12.25	11.75

(For Additional Prices See Page 708.)

Pig Iron Prices Advance Rapidly

Pittsburgh Records Highest Quotations in Nine Years—Inquiry for Export is Very Active in the East—Heavy Buying at Philadelphia

Pittsburgh, Oct. 3. — The pig iron market has continued excited this week. Prices of all grades have gone up from 50 cents to $1 a ton and further advances are imminent. Steel making and foundry grades now are quoted at the highest figures to prevail at any time since the historic levels attained in 1907. Bessemer pig iron this week has sold at as high as $23 a ton and some dealers have advanced prices to $25, valley.

A local consumer this morning paid $23, valley, for 1,000 tons of bessemer iron. The Cambria Steel Co. is understood to have purchased 10,000 tons of basic iron at $19.50, valley, and the Republic Iron & Steel Co., early last week closed for about 15,000 tons of this grade, paying $19, valley, for iron for first quarter delivery. We note a sale of 5,000 tons of basic iron for first half shipment at $19.50, valley. A consumer in the Wheeling district has taken 10,000 tons of bessemer iron and the Pittsburgh Steel Foundries is reported to have taken 5,000 tons of this grade. A prominent consumer in this city is understood to have been purchasing steel making pig iron, but it is not known definitely how much tonnage this concern has taken. Virtually all melters in Western Pennsylvania, eastern Ohio and West Virginia are figuring in the market for requirements.

The market for foundry iron also is active. No. 2 foundry and malleable irons are being held at $20, valley, by several dealers and small tonnages have commanded that figure. It is apparent that scarcely any more iron is available for shipment before July 1, 1917. Pig iron dealers in many instances have withdrawn from the market.

The average price of bessemer and basic pig iron in September was $21.9346 and $18.63, valley, respectively, according to compilations by W. P. Snyder & Co. Averages are based upon sales of 1,000 tons or more; sales last month involved about 150,000 tons. Bessemer iron in September advanced $0.9346 and basic iron advanced $0.63 over the average sales prices recorded the preceding three months. Averages for September are the highest recorded since 1907. In September of that year the average price of bessemer iron was $22, valley, and the average price of basic iron in the same month was $20.07, valley.

Heavy Buying Continues

Philadelphia, Oct. 2.—Another week of unusually heavy buying has marked the pig iron market in this territory and the total of transactions, which was not less than 100,000 to 150,000 tons, exceeded the record of the preceding week. The trading was much more diversified than previously and a large fraction of the orders was supplied by foundry iron. More Alabama iron than usual figured in the competition and easily 25,000 to 35,000 tons or more of southern metal were sold. One seller closed 15,000 tons at $15, Birmingham, for No. 2 for first half, a price of about $19.50, Philadelphia, and from $19.50 to $20 at other eastern Pennsylvania points was offered, which is below the quotations of most of the nearby furnaces. Some of the Alabama iron for next year was taken at $14.75 for No. 2 and for this year $14.50 was the usual price. Virginia iron, on which all the regular sellers of foundry now are quoting $17.50, furnace, for No. 2X or $20.25, Philadelphia, also has continued to command considerable of the going business. Some of the Virginia makers have accumulated good order books and there are signs that some of the active sellers there may soon advance prices. One, in fact, will accept no more $17.50 business for this year. Against the Alabama and Virginia competition, eastern Pennsylvania foundry has continued to show irregularity, but tends towards higher prices, or about a minimum of $20, Philadelphia, for No. 2X. There have been late sales at 25 to 50 cents under the level.

(For complete prices see page 708.)

Among the week's sales in foundry grades were 6,000 to 8,000 tons to the Baldwin Locomotive Works; 5,000 tons to the National Radiator Co., Trenton; 2,000 to 2,500 tons of Alabama to a Baltimore pipe works; 3,000 to 4,000 tons to an Emaus, Pa., pipe maker; 5,000 to 10,000 tons additional to Delaware river pipe shops; 1,000 tons of malleable and 500 tons of foundry to a Trenton buyer and many others, including one lot of 2,500 tons of Alabama. A Lansdale, Pa., consumer increased recent purchases to about 5,000 tons. Philadelphia stove makers were liberal buyers. A Philadelphia buyer took 500 to 1,000 tons of malleable, which is quoted from about $21.25 to $21.75, Philadelphia.

Much buying activity has continued in low phosphorus iron for delivery over all months of 1917. One eastern maker in the week sold 20,000 to 25,000 tons of standard iron mostly for last half to domestic users at $35 to $36, Philadelphia basis. An eastern steel works took 7,500 tons of this. About 10,000 tons of standard iron inquiry is current. Lebanon district makers closed for 25,000 to 30,000 tons including a round tonnage for export. Low phosphorus prices again have been advanced $1 to $36 and $37, Philadelphia, for standard and to $31, furnace for Lebanon brands.

Basic has been quiet. A sale of 1,000 tons was made at $20.50, delivered. Some makers now ask that price as a minimum and have quoted it on several thousand tons of pending business.

Heavy Basic Buying

Cleveland, Oct. 3.—The pig iron market is extremely active and the trend of prices is decidedly upward. The demand for basic has been especially heavy. The Cleveland Furnace Co. has sold 60,000 tons to the Central Steel Co., of Massillon, to be delivered at the rate of 10,000 tons per month during the first half of next year, while another Cleveland firm has sold 67,000 tons of various kinds during the past week, of which a large percentage was basic. For local delivery, one Cleveland company is now quoting $19.50, delivered, for No. 2 foundry, an advance of 20 cents. One Cleveland agency is quoting $19.75, valley, for No. 2 foundry and will probably advance to $20 within a day or two. The outlook is that there will be a decided shortage of basic.

High Record for Sales

Birmingham, Ala., Oct. 3.—As was anticipated, a large percentage of the previous week's pending tonnage of pig iron was booked the past week. Two producing interests report having booked 18,000 tons each for delivery through the first half of 1917 at $14.50 per ton at the furnace. Between 50,000 and 60,000 tons of iron were booked by the several companies, and some few sales were made on basis of $15 per ton at the furnace. In addition to the heavy sales made, the demands for shipments have been unprecedented; and if there was available a sufficient car supply to meet demands, substantial inroads would be made on stocks piled on yards. The volume of buying continues to grow each week and the tendency towards a firm $15 price is more in evidence each week. Fourteen dollar iron is practically nil at this time. The past week has set a high record in point of sales, and there is a cautiousness evident on the part of sellers as to booking too large a tonnage at present prices. In addition to large sales of foundry pig iron, some substantial sales of basic have been made on the basis of $15 per ton, f. o. b. cars at the furnace—between 12,000 and 15,000 tons. The cast iron pipe manufacturers have been very heavy buyers the past week, both southern and northern makers.

Heavy Demand for Export

New York, Oct. 3.—First prominence as to tonnage involved is being held by the export market in the pig iron activities of this district. The past week has developed an unusually heavy buying and inquiry of this sort and sellers are concentrating their attention upon these propositions. J. P. Morgan & Co. again have been large buyers for France and England and the recent lots purchased by this firm, principally low phosphorus and bessemer, are understood to have totaled not less than 60,000 tons. Inquiries from this source now current amount to 20,000 to 30,000 tons. An eastern Pennsylvania steel maker made one sale of 20,000 to 25,000 tons of low phosphorus to come from the Lebanon district at $30, furnace. Another sale was 2,000 tons of Alabama foundry to Italy. Holland is an active factor in the market and recently has bought not less than 10,000 tons of foundry from Alabama and Tennessee makers. Norway and Sweden also have bought heavily of the same grades. The recent purchases of one New York export house are put at over 20,000 tons. New inquiries include one of 18,000 tons; another of 12,000 tons, both bessemer and for Italy; and about 5,000 tons of foundry for different countries. Standard bessemer has become scarce for this year and prices for export have advanced considerably, being quoted at present at from $24.50 to $25, tidewater. There have been sales at the top mark. For southern iron, $15, Birmingham, and more, is being obtained. The suspension of the abolition of export freight rates Oct. 1 is a favorable development for the foreign buying.

The domestic market is bringing out a good business constantly and at rising prices. A soil pipe maker bought 4,000 to 6,000 tons of northern and southern iron for plants at Newark and in the south; a steel plant on the outskirts of this city closed for 2,000 to 3,000 tons of low phosphorus; a New Jersey stove maker took 1,000 tons of forge at $19, eastern Pennsylvania furnace; an Elizabethport buyer has bought malleable and foundry against a recent inquiry for 2,000 tons. The General Electric Co. is out for additional iron. Prices are firming up and it is more difficult to shade $20, tidewater, for No. 2X.

Buffalo Sales 35,000 Tons

Buffalo, Oct. 3.—Producing interests of the Buffalo district report sales for the week totaling 30,000 to 35,000 tons or over and remaining under negotiations are about 25,000 tons or more additional, included in the inquiry that developed in the past week or 10 days. While prices may conservatively be quoted at a range of $19 to $20, the maximum more nearly represents the market, as the heavy selling together with the fact that one large producing interest is not in a position to take on order for an additional pound of iron for delivery this year or the first half of 1917, has caused prices to materially stiffen in the past 48 hours.

Considerable over half of the tonnage placed is for delivery over the remainder of the present year. At least 20,000 tons of the total sales for the week are made up of orders from scattered sources for lots running from 100 up to 6,000 tons of foundry, malleable, basic, charcoal and special grades, and at prices from $19.25 to $20.

The demand that has developed is for last half needs and first quarter of the coming year. All of the furnace interests report more buyers coming into the market. The inquiry includes bessemer, charcoal, ferro-silicon and other special grades as well as foundry, malleable and basic. The demand for special grades is particularly heavy.

One producing interest reports that its minimum on any grade is now $20; another holds that the price is $19 to $20, and a third interest is out of the market entirely with absolutely nothing to sell.

The leasing of the Tonawanda Iron & Steel Co.'s two furnaces at North Tonawanda by the Donner Steel Co. for three years with an option to purchase the entire property of the former company takes these Niagara furnaces

(For complete prices see page 708.)

out of the possible merchant column and lines them up with the stacks of the district that have gone over to meeting the requirements of the steel makers.

While the two Niagara stacks of the Tonawanda Iron & Steel company have been out of blast for at least two years, melters heretofore were able to figure upon 13 merchant stacks in the Buffalo district, namely: Rogers-Brown, 4; Buffalo-Union, 3; Wickwire, 2; Niagara, 2; New York State Steel, 1; Charlotte, 1. Demands of the steel makers have cut this total to only seven stacks, and the merchant stacks remaining, not counting their present sold up condition, that may be available to meet the advance requirements of melters for foundry and malleable grades are: Rogers-Brown, 3; Buffalo-Union, 2; Wickwire, 1, and Charlotte, 1. Another stack is being completed for the Donner Steel Co., formerly the New York State Steel Co., but both its stacks are to be counted in the steel making column and with the completion of the steel mill addition to the Wickwire Steel Co's plant, it is figured one of its merchant stacks will cease to be classed as an available source of supply for melters.

The Wickwire company it is stated expects to be making steel ingots by Jan. 1 and shortly thereafter the company plans to have its new mill in operation.

Chicago Market Higher

Chicago, Oct. 3.—Strong general inquiry and almost equally large buying of pig iron are being experienced in the Chicago market. Consumers apparently are anxious to cover their requirements for first half and close readily, few inquiries hanging over any length of time. Buying is principally for first half of 1917 and in some instances an effort has been made to place contracts for delivery during third quarter of next year. However, makers are not anxious to take business so far in the future and have refrained from quoting prices further than first half.

Recent selling for next year's delivery has been heavy and on the strength of this northern No. 2 foundry has been advanced to $19, furnace, with malleable at the same figure, the latter grade not advancing, as competition from Lake Superior charcoal iron prevents an increase at present. This quotation, $19, Chicago furnace, for both foundry and malleable, applies to last quarter and first half delivery.

Southern iron is much firmer and some interests find themselves practically out of the market and unable to take further tonnage. Most southern sellers are quoting $15, Birmingham, for last quarter and first half, while one maker is willing to accept prompt tonnages of limited size at $14.50, Birmingham. Rumors are heard occasionally of sales being made at $14, furnace, which are attributed to resale iron.

Demand for export iron continues to be felt, although most sales of this character are made in the east where freight rates are more favorable. The pressure for iron to go abroad is shown by the fact that a constant demand is experienced in Chicago for iron which apparently cannot be obtained from eastern makers. Most sales for export are of standard bessemer and some shipments have been made through New York from this territory, while other contracts are being filled at present. Standard bessemer is scarce in this market and is commanding $22, furnace, although for export a somewhat lower figure is named to care for part of the added freight rate to tidewater.

An offer of No. 2 southern foundry for 1917 delivery at $12, Birmingham, has created some interest in this market, but it is not believed the tonnage available is sufficient to make this an important factor. It is believed this price is named in an effort to obtain a back-log for a furnace not now in blast but which may become active if sufficient orders can be obtained.

An important southern producer is said to have sold practically three months' output in a single month during the present buying movement, which indicates the extent to which contracting has been carried in the past few weeks.

Silveries and charcoal iron remain at the same quotation as for several weeks past and both are firm and moving steadily.

Quiet at St. Louis

St. Louis, Oct. 2.—The pig iron situation was quiet in this market last week, and all inquiries seem to have been cleaned up. Sales throughout the week were rather light, and confined to small lots. Southern No. 2 is held at $15, Birmingham, for first half delivery, and at $14.50 to $15 for delivery over the remainder of the year.

Northern iron is firm at $19, Chicago, and $19, Ironton.

Buying Continues

Cincinnati, Oct. 2.—Buying of pig iron in this territory continues satisfactory. The Andrews Steel Co., Newport, Ky., has purchased between 20,000 and 25,000 tons of basic iron for delivery over the first half and extending into the second half of next year. It is also reported that a large pig iron maker in Alabama has sold between 150,000 and 200,000 tons of basic iron recently, and will put two stacks on this grade in the near future. The Williamson Heater Co., this city, has purchased 1,000 tons of southern foundry iron for the first half of next year, and a West Virginia user has taken 3,000 tons of standard bessemer iron for the same shipment. Other sales include 1,500 tons of silvery iron, 6,000 tons of charcoal iron, and 1,000 tons of Virginia iron to Michigan melters, all for first half delivery. Sales are developing mostly through private solicitation, as very few general inquiries are being sent out by melters in this territory. A large tonnage of bessemer iron, approximately 30,000 tons, has been sold by southern Ohio furnaces recently, principally by Wellston, O., and Ashland, Ky., stacks. Part of this was for export shipment, but the majority went to melters in Pittsburgh territory.

The price of southern iron is firm. No. 2 foundry is quoted from $14.50 to $15.50, Birmingham basis, for spot shipment and the first half of next year, with the majority of furnaces holding between $15 and $15.50. Southern Ohio No. 2 foundry, malleable and basic are quoted from $18.50 to $19, Ironton basis, for the first half of next year.

Wire Prices

May Be Advanced at Any Time—Heavy Specifications

Pittsburgh, Oct. 3.—The expected advance in the price of wire products failed to materialize. It generally was believed that quotations would be put up either last Saturday or Monday, but no formal announcement of any changes has been made. Some mills, however, are quoting above published quotations. Specifications against contracts in September were considerably heavier than those received in the preceding month. There has been a noticeable improvement in the domestic situation. Nails are being held at $2.60 a keg and plain wire at $2.55 per 100 pounds.

Heavy Specifying

Cleveland, Oct. 3.—Specifications against wire contracts came in rapidly before the close of last month and not a pound remained unspecified Oct. 1. Deliveries on flat wire have been greatly delayed and the demand for this product is very active.

(*For complete prices see page 708.*)

Bar Buyers Are Troubled

On Account of Inability to Obtain Delivery—Some Letup in Pressure from Automobile Manufacturers

Chicago, Oct. 3.—Buyers of soft steel bars find it practically impossible to obtain further supply except for indefinite delivery, which will not be earlier than third quarter of 1917. The leading independent producer in this territory is virtually out of the market, with its output under contract through first half, with a possibility that it will not be able to furnish the tonnage now under contract without running over into third quarter. The leading interest is taking contracts for indefinite delivery on a basis of 2.79c, Chicago mill, for bars and demand is not lessening, while the volume of new business in finished steel is larger than shipments from mill.

Specifications are being filed in large volume, exceeding either new business or shipments, as has been the case for the past 60 days.

Production and shipment by mills are being hastened and the tonnage turned out during September is approximately equal to the high records made during April and May, before the heated term began to cut into mill operation.

Hard steel bars continue steady at 2.50c, Chicago mill, with excellent demand and good bookings. A shortage in old rail stock to be converted into hard bars seems imminent and this is believed to be due to shortage of cars, which causes railroads to defer gathering their old rails, thus tying up part of their rolling stock. Prices on rails have advanced steadily, but apparently are not yet at a level to be tempting to railroads. Most rerolling mills have a comfortable reserve and will not feel the shortage for some time. A few sales have been made for delivery in 1917, but the volume of this business is small.

Buyers Offer Specific Orders

Philadelphia, Oct. 2.—Consumers of steel bars who have not been able to place term contracts with the mills now are offering to close specific orders at 2.60c, Pittsburgh, and in certain cases this business has been accepted. The number of prospective buyers still in the market, however, is considerable and appears to be on the increase, as the difficulties of their position have not been modified. This applies especially to the consumers, as the jobbing trade is not so active in seeking additional mill space. In scattered cases, some contracts are being taken by barmakers and 2.60c, Pittsburgh, is being paid freely. One large producer, who recently booked a number of bessemer bar contracts for last quarter and first half at 2.50c to 2.60c, Pittsburgh, this week advanced his price to 2.75c, Pittsburgh. Most of the regular customers of this mill now are cared for. A consumer in this territory was the buyer of 2,000 to 3,000 tons of bessemer screw stock for early delivery.

Steel Bars Active

Pittsburgh, Oct. 3.—Several prominent manufacturers advise that domestic demand for steel bars last month showed moderate improvement, and orders involving rounds for the manufacture of munitions have not fallen off. The Carnegie Steel Co. and the Jones & Laughlin Steel Co. are asking 2.60c for bars for delivery at their convenience. Iron bars are being held at 2.65c.

Active Domestic Demand

Buffalo, Oct. 3.—Mills are continuing to quote 2.60 notwithstanding the increase reported in shapes. The domestic demand is on the increase and producing interests are endeavoring to give home users the preference over orders that are coming in for export tonnages. On this account it is particularly difficult to find placement for oversea business.

Decrease in One Direction

Cleveland, Oct. 3.—The decrease in demand for bars from automobile manufacturers is more pronounced this week and is generally attributed to the present being the between-seasons period, rather than to any decrease in demand from consumers. This change is welcomed by the steel makers, who have experienced the greatest difficulty in satisfying their customers.

Rerolled bars for reinforcing are stronger and although active competition continues, it is not so easy to shade 2.50c, Cleveland. Mills usually are quoting without regard to the Pittsburgh basis. A considerable tonnage is being rerolled from crop ends, resulting from the manufacture of shell steel.

Bar Iron Strong

Chicago, Oct. 3.—Bar iron is firm and strong at 2.35c, Chicago mill, for last quarter or first half delivery. Occasionally a small tonnage is placed at 2.40c, Chicago, but this figure is not regarded as the market, because it has applied in only a few instances when usually some extra consideration was involved. Demand is strong and sales are more than equal to production. Some mills have booked practically their entire last quarter production while others are holding to 60-day contracts.

Shafting Active

Pittsburgh, Oct. 3.—Some manufacturers of shafting are asking 10 per cent off the list for carloads, or $10 a ton above the minimum price. The 20 per cent off the list quotation has not entirely disappeared. Specifications are heavy and new demand is described as active. Manufacturers are selling cautiously, not wanting to dispose of their output too far ahead.

Hoops and Bands

Pittsburgh, Oct. 3.—Prices of steel hoops and bands have not been changed recently; hoops are offered at 3c and bands at 2.60c for delivery at the convenience of the mill, which means from nine to 12 months hence. Prospective purchasers say no tonnage is available for prompt delivery.

(For complete prices see page 708.)

Warehouse Prices

Moved Up in the East—Decided Advance Made on Plates

New York, Oct. 3.—An irregular advance ranging from $2 to $10 per ton in leading products has been put into effect by jobbers in this district. Structural shapes and steel bars are up $2 or from 3.25c to 3.35c, delivered, in metropolitan territory. Narrow width plates are unchanged at 4 cents, delivered, and wide plates have been advanced $5 to $10 or to 4.50c, delivered. Present business is limited to practically only the amount of steel that can be offered since the jobbers have great difficulty in keeping up their stocks.

Boiler Tubes Up

Cincinnati, Oct. 3. — Warehouse prices continue strong, and the advances that were made last week are firm. No changes have been made in quotations on bars, shapes, and plates, but boiler tubes are given at better figures as follows: Beginning with 2-inch, 27 per cent off, 22 per cent off, 27 per cent off, 35 per cent off, and 37 per cent off. Cold rolled bars are unchanged at 10 plus the list price. Business is brisk and very satisfactory.

Robert G. Tener, formerly assistant treasurer and director of the United Engineering & Foundry Co., Pittsburgh, has purchased the plant of the Braddock Machine & Mfg. Co., Braddock, Pa. The plant, 90 x 300 feet, is located in Braddock.

Plate Tonnages Are Placed

Buyers Willing to Pay High Prices—Inquiries for 20,000 Cars Pending at Pittsburgh—Some Price Peculiarities

Philadelphia, Oct. 2.—Placing of some sizable tonnages of plates under either specific or contract requirements is resulting from the presence in the market recently noted, of a number of the large buyers apart from the shipbuilders. These consumers show a greater willingness to pay the prices which the mills have been asking. A contract for 7,500 tons for first half was placed with one eastern mill at 4c, base, Pittsburgh. A leading eastern boiler manufacturer closed for a considerable tonnage. The American Car & Foundry Co. has closed for a good tonnage, principally universal plates, covering recent car orders. One large plate producer has taken on during the past two weeks from 50,000 to 60,000 tons of new plate business, most of which was from the shipyards. There is much prospective marine tonnage before the mills exclusive of the new vessels for the navy, but this is not expected to be closed for several weeks. Export demand is keeping up to large proportions. A new English inquiry calls for 5,000 tons. There is a report that the English government is seeking plates as a direct buyer.

Plate prices still show considerable divergence, but the two or three leading eastern makers are holding stoutly for 4c, Pittsburgh, or 4.159c, Philadelphia, on tank quality. Lower quotations are obtainable from other producers, especially on the narrower widths, where 3.50c, Pittsburgh, was done this week. Even 3c, Pittsburgh, sometimes is obtainable. Universals, which can still be had in six to eight weeks, are selling at 3.50c, Pittsburgh, among the larger eastern mills. In making contracts plate makers in the east are insisting that buyers close only for actual needs, as they state they will not permit subsequent cancellations.

Twenty Thousand Cars

Pittsburgh, Oct. 3.—Although manufacturers have not formally advanced prices, it is more difficult than ever to obtain material at prevailing quotations, even for delivery at the convenience of the maker. Some of the more important mills virtually have withdrawn from the market, because of their inability to take on additional tonnage for delivery next year. Car builders are playing an active part in the market and indications are that car material will command current prices. Inquiries for fully 20,000 steel cars have been under consideration for a couple of weeks and, despite high prices, it is likely that a number of attractive orders will be placed soon.

For anything like prompt delivery, mills are asking from 3.50c to 4c for plates, although the 3c price continues to be quoted for delivery at the convenience of the maker. More favorable weather conditions have enabled manufacturers to increase production slightly, but the car situation is so acute that shipments have not improved appreciably.

Freight Demand Holds

Chicago, Oct. 3. — Pressure for steel plates on the part of car and ship building companies and for general purposes continues strong, while mills are practically unable to assume further tonnages for any definite delivery. Even smaller mills, which for a long time were able to take on prompt tonnage, have lost their commanding position to some degree and are sold further into the future than has been their custom. Difficulties on the part of buyers in seeking to obtain anything like prompt delivery have been much increased.

Some tonnages recently sold have commanded as high as 4.19c, Chicago, and a higher premium than this could be obtained were the tonnage available.

Hard to Get

Buffalo, Oct. 3.—Producers report that plates are almost impossible to obtain at any price. Mills on this product are booked to the limit of their willingness to take on tonnages for remote deliveries. Some orders have been placed, at mills' convenience at 4 cents.

Quotations Advanced

Cleveland, Oct. 3.—The plate market is exceedingly strong and one local company which had quoted as low as 3c lately is now maintaining a minimum of 3.25c on light plates and the same on No. 10 black sheets. Eastern mills are adhering to their high quotations.

Pullman School Dedicated

The Pullman Free School of Manual Training, at West Pullman, Chicago, was dedicated Sept. 30. The school was built as a result of a bequest of $1,200,000 by the late George M. Pullman, head of the Pullman Co., "To found, erect and endow a free school of manual training for the children of persons living in and employed at Pullman."

This fund, through careful investment since Mr. Pullman's death, has grown to more than $3,000,000 and only a part of this sum was used to erect the school.

Dr. Harry Pratt Judson, president of the University of Chicago, made a dedicatory address and the inaugural address was by Dr. Laenas G. Weld, principal of the school. A bronze tablet in memory of the founder was unveiled by two grand-children.

Cast Iron Pipe

Not in Active Demand for Cities—Southern Outlook Better

New York, Oct. 3.—New York City is preparing to put out a request for bids on 500 to 1,000 tons of pipe. Newark, N. J., also is expected to be in the market in the near future for 2,000 to 3,000 tons of 6 to 24-inch. Such proposals from municipalities, however, are few in the pipe market at present. Miscellaneous business is furnishing a fair amount of new tonnage, but this is not sufficient to maintain operations, and instances are to be noted where eastern pipe foundries now show considerable slack in their operations. Prices are steady.

Increased Inquiry

Birmingham, Ala., Oct. 3.—Manufacturers of cast iron pipe report increased demands for the past week, and that some large tonnages are at present pending for certain middle-western cities. Soil pipe manufacturers also report a 10 to 15 per cent increase in their business, and all these plants in the district are running between 75 and 80 per cent normal. Prices are reported very firm in the face of the firmness of the pig iron market, and many of the pipe interests have made substantial contracts for iron the past week. Following prices are quoted for high pressure pipe, per net ton f. o. b. cars plants; 4-inch, $29; 6-inch and up, $26, with $1 per ton extra for gas pipe and 16-foot length.

Quiet at Chicago

Chicago, Oct. 3.—Comparatively little activity is being shown in the cast iron pipe market, as would be expected at this season. The American Cast Iron Pipe Co. has been awarded 154 tons at Gilbert, Minn., and 693 tons for a special assessment job in Chicago is in the hands of contractors and has not yet been placed.

Bids were to be opened Oct. 2 at Ellis, Kas., on 212 tons, at Minneapolis, Kas., on 160 tons and at Detroit on 500 tons.

(For complete prices see page 708.)

Sheet Business Improving

Minimum Quotations Disappearing—American Sheet & Tin Plate Co. Advances Prices

Youngstown, O., Oct. 3.—Predictions made a few weeks ago that the sheet mills would enjoy better business during October than in any month for some time seem certain to come true. A large number of ininquiries reached the sales offices in this district yesterday and today while many sheet buyers are making personal visits in an effort to hasten deliveries. One sales manager pointed out that he had received more visits from sheet buyers in the past week than in any like period for two years.

Keen interest is being taken here in the action of the leading interest of the Pittsburgh district in raising its prices on black and blue annealed sheets, and in withdrawing from the galvanized market. The new minimums announced by this interest have not been generally adopted here, although some makers have been quoting higher for some time. Against the announced minimum of 3.15c on black sheets, made by the Pittsburgh interest, quotations of 3.00c have appeared in this district during the past few days. At the same time, other mills are quoting 3.25c. A wider tendency, however, is being displayed to withdraw the 3.00c quotation and it is believed that a minimum of 3.10c will be made within a short time.

Galvanized sheets have been moving at 4.30c and 4.35c, but the resumption of demand has strengthened the position of the mills on forward business and higher quotations are being made. The increasing strength of the galvanized-sheet market in the face of only slight changes in spelter prices, lends emphasis again to a fact not generally appreciated, that is, that steel prices and not spelter have the greater influence in determining quotations on coated sheets.

The blue annealed market is comparatively quiet. Most mills have a heavy tonnage of forward business still to roll. Increasing costs of steel and the greater strength of the sheet market are causing the 3.00c minimum on this grade to be observed more firmly. The Trumbull Steel Co., Warren, O., expects to put its new blue annealing furnaces in operation shortly.

The car situation continues acute. Shipments are being seriously interfered with, mills on some days receiving only a fractional part of the cars asked for. Box cars in particular are hard to obtain, although one mill is finding more difficulty in securing gondolas. This mill, which is operated in connection with a steel plant, points out that 60 per cent of the cars bringing material to the plant are not serviceable for handling shipments of finished materials.

Prices Stiffening

Pittsburgh, Oct. 3.—All grades of steel sheet products reflect strength. The American Sheet & Tin Plate Co. has advanced prices of blue annealed sheets to a minimum of 3c for No. 10 gage bessemer and No. 28 gage bessemer black sheets are being held at 3.15c; for open hearth stock, mills are asking $2 a ton above the price of bessemer steel. Galvanized steel sheets are scarce; the leading interest has withdrawn from the market for fourth quarter delivery and independent manufacturers are asking 4.40c and above for No. 28 gage.

Demand for sheets is exceedingly heavy. Specifications against contracts in September involved more tonnage than those entered during the preceding month. Galvanizers are operating plants at nearly normal capacity and most consumers of coated material have covered normal requirements for the remainder of the year.

Sheets Continue Strong

Chicago, Oct. 3.—The strength in the steel sheet market, which has been increasing recently, is holding and with higher prices on sheet bars, present quotations are expected to be exceeded on the finished product. As pointed out last week, No. 10 gage blue annealed and No. 28 gage black are quoted at the same price, 3.19c to 3.29c, Chicago mill, and black sheets are expected in the course of a few weeks to assume nearly their usual position several dollars per ton higher than blue annealed. Demand for sheets is excellent and this department of the market is becoming more active.

Price Trend Upward

Cleveland, Oct. 3.—Although the prevailing quotations on sheets are not less than 3 cents on No. 10 blue annealed and No. 28 black, a leading producer a few days ago quoted 2.90c on both blue annealed and black. Very recently the market has shown a tendency to get away from the very lowest of the quotations.

Tin Plate Reflects Strength

Pittsburgh, Oct. 3.—Because of the great strength of the market for tin plate, it is likely that manufacturers will ask more than $5.50, base, for material for shipment next season. Virtually all the manufacturers in this district will carry over into the year of 1917 enough tonnage to keep plants operating at present rates of capacity for from 60 to 90 days. Expressions are heard that consumers may pay $6, base, for tin plate next year, but no formal prices have been named. Much tonnage, however, has been reserved for delivery in 1917.

(For complete prices see page 708.)

Ore Movement

Continues at Record-Breaking Rate—Heavy Reservations

Cleveland, Oct. 3.—Iron ore shipments for September amounted to 9,600,786 tons and all indications now are that the movement for the season will be at least 62,000,000 tons. To Oct. 1 the movement amounted to 48,816,650 tons, and it will not be at all difficult to move 8,500,000 tons this month and 4,500,000 tons for the remainder of the season after Nov. 1.

Two firms have made large reservations of iron ore for next year's delivery, but others are not disposed to do so at the present time. There is little inquiry as to prices. It is not expected that there will be any definite developments along this line for a number of weeks.

Port.	Sept., 1915.	Sept., 1916.
Escanaba	1,015,820	922,517
Marquette	539,879	557,1[illegible]0
Ashland	1,028,363	1,255,328
Superior	1,557,935	1,945,171
Duluth	2,428,689	3,455,611
Two Harbors	1,292,460	1,465,019
Totals	7,863,146	9,600,786
1916 increase		1,737,640

Port.	To Oct. 1, 1915.	To Oct. 1, 1916.
Escanaba	4,011,682	5,630,994
Marquette	2,313,532	3,026,845
Ashland	3,829,582	6,051,712
Superior	5,997,023	9,760,946
Duluth	11,807,219	16,174,159
Two Harbors	6,710,528	8,171,974
Totals	34,669,566	48,816,650
1916 increase		14,147,084

Magnetites Sold

Philadelphia, Oct. 3.—Some round tonnages of New Jersey non-bessemer magnetite ores analyzing 58 to 60 per cent in iron for delivery over the first half of 1917, have been sold to eastern Pennsylvania furnaces on the basis of 9 cents per unit, delivered. This is an advance of ½ cent or more per unit, for ore of the quality sold over the price that prevailed during the last half, equivalent to perhaps 25 to 50 cents per ton. Sellers now are disposed to accept nothing less than 9½ cents per unit, delivered, on further tonnages of mineral of the same character. Other sellers of local eastern ores have not yet opened their books for 1917 shipment.

Delivery of Structurals

Is a Matter of Prime Importance—Award for New York Central Hotel is Made—Quebec Bridge Tonnage Pending

New York, Oct. 3.—The problem of delivery continues prominent before both buyers and sellers of structural material and it is interfering with the acceptance of business, especially by the fabricating shops. Some buyers requiring early delivery, are rendering their propositions more unfavorable from a seller's standpoint by inserting in their contracts heavy penalties for overtime shipment. The government, in awarding Norfolk navy yard extensions, accepted a promise of 180 days' delivery. New structural business is of good volume with the larger tonnages showing up well. One of these was the award of the 15,000-ton New York Central hotel the past week. Fabricators are looking forward to a large amount of bridge work to be offered during the winter by eastern railroads. Steel Corporation mills, it is understood, will furnish 6,000 tons of plain material to the St. Lawrence Bridge Co. to replace the Quebec bridge span which was lost recently. Plain material prices are strongly held at a minimum of 2.70c, Pittsburgh, or 2.869c, New York.

Very Heavy Specifying

Buffalo, Oct. 3.—Prices on structural material have been advanced generally by the mills and agencies of the district to 2.70. In this and other finished material lines the producers report that specifications for the month of September were the heaviest recorded in a number of months.

Eastern Mills Again Advance

Philadelphia, Oct. 2.—Price advances in structural shapes have been general among eastern mills during the past week. One mill boosted its minimum to 2.70c, Pittsburgh; another, which began quoting 2.75c, Pittsburgh, about a week ago, went to 2.80c, Pittsburgh; while a third large producer is asking 2.85c, Pittsburgh. Any concessions from these prices would be only to the most preferred customers. Generally these prices are for specific business and makers are not desirous of making contract quotations. In one case, 2.85c, Pittsburgh, was named on a first quarter contract. The mills have a hard time in keeping their obligations from becoming unwieldy, as their active orders usually run ahead of shipments. Specifications are active and cancellations are few. Miscellaneous new business furnishes a liberal tonnage and a number of large single tonnages are coming up. The government has awarded 5,000 tons for Norfolk navy yard extensions. An interesting matter is the inquiry to eastern mills by the St. Lawrence Bridge Co. for 5,000 to 6,000 tons to replace the center span of the Quebec bridge, which fell recently. Canadian car builders who are figuring on the large Russian equipment order, again have asked eastern mills for protection on the shapes and name the amount as 20,000 tons, which is larger than originally inquired for. Eastern shape makers are closing some business for western shipment at 2.75c, mill.

Shapes Held at 2.70c.

Pittsburgh, Oct. 3.—Independent manufacturers of structural shapes have adopted the 2.70c price, announced Sept. 26, by the Carnegie Steel Co. As reported in these columns a week ago, steel bars and steel plates were not affected by the advance in the price of shapes. Specifications are coming out in heavy volume and some new demand is reported. A number of large structural undertakings are under consideration, notwithstanding the high price of material.

Delivery Paramount

Cleveland, Oct. 4.—The question of delivery is of paramount importance in the structural market at the present time. This is illustrated by the action of the George A. Fuller Co., general contractor for the improvements to be made to the building formerly known as the John Hartness building, but now called the Euclid building. The improvements involve 1,000 tons of shapes and quotations were received from numerous companies. While prices varied considerably, the important question was as to delivery and the award was made to an independent company, which, it is understood, has promised delivery on a large part of the tonnage in three months, while other companies were unable to guarante delivery in less than five months.

Structural Society Meets

Chicago, Oct. 3.—Members of the Structural Steel Society, numbering about 30, mostly fabricators of structural material, met in Chicago this week and discussed the shortage of material that is hampering their business. The impression is that the greatest building boom the country ever has seen is being prevented by the lack of steel, and the opinion is held that this is caused by the drain resulting from export of steel as a direct or indirect result of the European war.

Means to assure a better supply of material were discussed and the plight of the fabricators has been placed before steel mills generally in an effort to obtain better deliveries. A delegation visited the Gary plant of the Illinois Steel Co. to impress more deeply the need for larger shipments.

Up $2 at Chicago

Chicago, Oct. 3.—Following the advance of $2 per ton on structurals by eastern producers last week, western mills put an equal increase into effect Monday, raising the quotation from 2.79c, Chicago mill, to 2.89c, Chicago mill. As a matter of fact, the price does not cut much figure at present except to the buyer, as mills would be satisfied if demand would cease entirely for the present and allow some progress to be made in filling obligations already made.

Contracts closed in the west recently are for small tonnages and in smaller number than has been the case the past few weeks. Only one totals 1,000 tons and the remainder are much smaller.

CONTRACTS AWARDED

Arthur H. Fleming Co., blackstone office building at Los Angeles, Cal., 1,000 tons to Llewellyn Iron Works.

Utah Copper Co., structural steel for screening bins and crushing building, Leaching plant, 360 tons.

Machine and structural shop extensions to the Norfolk navy yard, 5,000 tons, steel work to McClintic-Marshall Co.; general contract to Geo. E. Wyne, Washington.

New York Central hotel, Lexington avenue, Forty-second and Forty-third streets, New York City, 15,000 tons, to American Bridge Co.

Steel work for 239th street subway yard, New York City, 1,650 tons, to McClintic-Marshall Co., by P. J. Buckley & Co., general contractors.

Turn tables for the Southern railroad, 300 tons, to Phoenix Bridge Co.

Substructure for Paterno Bros. apartment, Park avenue and Forty-seventh street, New York City, 3,500 tons, to an independent shop.

Section No. 2 of route 12, Eastern parkway subway, Brooklyn, 2,340 tons, Degnon Construction Co. awarded general contract and steel will be furnished by American Bridge Co.

Plant for the International Nickel Co., near Toronto, Ont., 3,000 tons, placed with the Dominion Bridge Co. by the general contractor, the Foundation Co., New York.

CONTRACTS PENDING.

Mill for the Knickerbocker Portland Cement Co. in Cuba, 300 to 400 tons, bids being taken.

Buildings for the American Sugar Refining Co., Boston, 200 to 300 tons, bids being taken.

Winter Garden, Buffalo, Esenwein & Johnson, architects; company being formed, taking bids, requiring 300 tons structural.

(*For complete prices see page* 708.)

Billets Scarce

And Very Little Tonnage Changing Hands—Prices High.

Philadelphia, Oct. 2.—Large eastern Pennsylvania steelmakers who have been selling round lots of shell bar discards and crops for rerolling now have disposed of all the tonnage they have available. The prices obtained have covered a spread of $30 to $40, mill. Offering of billets and other semi-finished forms for sale by eastern producers has become extremely limited owing to the great absorption of metal of their own finishing mills. Some producers, in fact, continue in the market in an effort to supplement their own steel supplies. A sale of 1,500 tons of bessemer billets for nearby shipment to a user in this territory is noted. Export demand is active. Such makers in the east as are quoting prices ask $48 to $50, mill, for open hearth rolling and $65, mill, for forging steel.

War Contracts

New York, Oct. 3.—Some good-sized contracts for finished munitions, shell forgings or steel, continue to be placed or offered, although the movement is an irregular one and it bears small resemblance to the general buying which went forward on a large scale some weeks ago. The principal bar to much new business is the fact that capacity is so well taken up until July 1, 1917, so that there are various opportunities for new contracts which cannot be seized by the sellers. Canadian interests have placed some further orders for large shell forgings in this country including one of 100,000 of 9.2-inch. A munition manufacturer has inquired for 40,000 tons principally of 6 to 8-inch rounds and billets to cover a munition contract with the Italian government. This matter is exclusive of the recent inquiry for the same tonnage of shell steel put out by the Italian government.

Firm at Pittsburgh

Pittsburgh, Oct. 3.—Demand for semi-finished steel products continues heavy. Specifications against contracts are coming out in good volume and some new demand is reported. Mills are asking from $45 to $50, mill, for both billets and sheet bars, although not much tonnage is available for nearby shipment. In fact, some consumers have been seriously handicapped, because of inability to obtain material. Wire rods are being held at from $55 to $60, Pittsburgh, although those figures are regarded as nominal, because of the absence of recent selling. Heavy demand exists for forging billets, which are commanding $70 a ton and above.

Shell Buyers Expected

Youngstown, O., Oct. 3.—The market for semi-finished materials has been unusually quiet during the past week and the volume of inquiry also has dropped away. Steel producers in this district are well sold up for weeks ahead and with adjustments of sheet bar contracts for the fourth quarter taken care of, there is little expectation of a marked resumption of buying for some time. Shell-steel buyers are expected to appear in the market during the present quarter for the remainder of their first half requirements.

Southern Basic

Bought in Large Tonnages by the British Government.

New York, Oct. 4.—The British government has closed a contract for 100,000 tons of southern basic with the Sloss-Sheffield Steel & Iron Co. to be shipped over the next six months, beginning in October. The buyers will furnish the vessels to move the iron. The Sloss company, which has not made basic for several years, now has started two furnaces at Birmingham and North Birmingham to fill this order. Another Alabama maker is credited with having sold recently upwards of 100,000 tons of basic, considerable of which is for export. This will take up its production far into next year.

It is understood these export sales of basic were around $14, Birmingham, but nothing under $15 can be done today. The British government is still in market for 100,000 tons of southern basic. With other liberal sales, both domestic and export, the Alabama market has become strong and higher prices are indicated.

Cold Rolled Strip Steel

Pittsburgh, Oct. 3.—Cold rolled strip steel makers have not opened books formally for shipment next year, but many of them will not be able to meet their tonnage obligations until after Dec. 31, next. For future delivery, mills are asking from 6c to 6.50c, base; premium prices are being paid for prompt shipment.

(For complete prices see page 708.)

Ferro Prices

Show Some Irregularity—Contract for Brazilian Ore

New York, Oct. 3.—Some reports of further price irregularity in ferro-manganese, pertaining both to domestic and imported metal, have been given more prominence. Certain orders, it is learned, recently have been taken for domestic metal around $160, delivered, principally through middlemen and it is known that at least one car of resale English metal was sold at $160, seaboard basis. It is believed, however, that these transactions have been relatively unimportant and exceptional. It is pointed out that domestic makers during the past week or 10 days have been able to book orders for several thousand tons additional, some of them of good size, at their regular quotation of $165, delivered. Agents of English producers continue to report very few new sales at their continuing quotations of $164, seaboard. Some of the English makers can offer no ferro-manganese before the first half. Others are selling both for this year and for first half. Domestic electrolytic ferro-manganese is being offered at $164, seaboard.

There has been more buying of spiegeleisen both for domestic and export shipment. About 1,000 tons were sold abroad this week and 1,000 to 2,000 tons to home buyers. The market has shown some price irregularity in sympathy with ferro-manganese, but for this year, domestic metal is firm at $45, furnace, for 20 per cent.

Contract for Brazilian Ore

New York, Oct. 3.—One of the largest sales of manganese ore yet made in this country has been consummated by the closing of a contract for the delivery of about 200,000 tons of standard quality Brazilian ore containing about 48 per cent manganese for delivery over the entire year of 1917. The United States Steel Corporation, which for the past two years has bought heavily of Brazilian ore, is understood to have been the purchaser in this case. The contract was placed on the basis of 2s or 48 cents, per unit of manganese, delivered f. o. b. steamers Rio Janeiro. The buyers are to furnish the vessels for transportation to this country and the entire freight will be to their account. The present open freight rates between Rio Janeiro and Philadelphia or Baltimore are $12 per ton, so that the purchase represents an approximate equivalent of 75 cents, per unit, delivered aboard cars at Baltimore and Philadelphia. Other negotiations for manganese ore are being carried forward. There have been some offerings of small lots of Japanese ore.

Serious Scrap Congestion

Has Developed in the Cleveland District, But Embargoes at Coatesville and Chicago Have Been Lifted—Conditions in Other Centers

Cleveland, Oct. 3.—Congestion of the unloading facilities of consumers' mills again is becoming a marked problem in the local iron and steel scrap situation. One rolling mill is reported to have 44 cars in and near its yards waiting to be unloaded. At least two other leading mills have held back shipments, and will continue for at least a few days. This new feature of scrap has shown itself in a reduced volume of trading but not in lower levels of prices, especially those of the heavier grades of material.

Heavy melting steel is a trifle stronger than last week, and No. 1 busheling is rapidly taking on good gains. Old steel rails under 3 feet in length which have been held for a long time at $18, now are bringing $19 a gross ton. The remaining grades on the list have gone unchanged throughout the past week. Local steel mills have not closed for heavy melting steel requirements since their offers still are below the dealers' prices, but a second user of busheling scrap has taken a tonnage of No. 1 stock at $14.25 a net ton for delayed delivery.

Chicago Scrap Firm

Chicago, Oct. 3.—Scrap prices in the Chicago market appear to have reached a steady level and are approximately the same as last week, having reached a level almost as high as during the most early portion of this year.

Embargoes in effect at two consuming points have been removed and material probably will be moved somewhat more freely than has been the case during the past fortnight. Some buying is being done by consumers generally and it is expected that some larger buyers may enter the market in a short time for heavy tonnages

Railroad offerings at present are moderate and include the following tonnages: Chicago & North-Western 4,285 tons, including 500 tons of steel rails; Santa Fe railroad 4,245 tons; the Pullman Co. 180 tons of steel axles; Chicago Great Western railroad 600 tons; George W. Jennings 400 tons of car wheels; Mobile & Ohio railroad a wrought iron bridge containing about 80 tons.

Embargo Lifted

Philadelphia, Oct. 3.—An embargo which has been in effect at Coatesville for some weeks has been lifted and this has brought into the market a number of brokers who are paying $15.50, delivered, to cover old orders for heavy melting steel. This price is above that which eastern steel makers will pay. The latter remain out of the market. Instead of being buyers of heavy melting steel, some of the eastern works, and one large company in particular, have turned sellers because of their duplexing operations, and they have been disposing of good tonnages to other steelmakers. An active absorption of borings and turnings by steel works blast furnaces from the excessive supplies being offered continues, and this includes turnings from shell stock. Foundry furnaces, however, usually will take only cast borings. The market exhibits a stronger undertone and its prospects seem improved, but general buying of any large extent from consumers still is lacking except in wrought grades and in some of the specialties.

Active at Buffalo

Buffalo, Oct. 3.—Dealers report an active and stiffening market. The demand has become stronger for practically all the commodities on the list. Heavy melting steel, very active, has gone up to $17 to $17.50; No. 1 railroad wrought scrap has advanced to $18.50 to $19. The demand for old car wheels has stiffened the price to $13.50 to $14 and wrought pipe has also gone up in price to $12.50 to $13.

The yards of the Buffalo district report that the sales and the inquiry generally are such that further advances in prices are likely to occur at any time.

Irregular Conditions

New York, Oct. 3.—Some of the heavier and better quality grades of old material such as wrought and melting steel, are in demand at somewhat better prices, but the lighter and lower classifications do not acquire any better activity. The result is a continuation of irregular market conditions. Heavy melting steel now is being taken for Pittsburgh delivery at $14, New York, or $16.10, delivered. Brokers are offering up to $13.75, New York, for steel for Coatesville delivery. There are no new orders for steel from eastern Pennsylvania consumers, however. For city wrought, $18.50, delivered eastern Pennsylvania, is offered and for shafting, $21, delivered. Stove plate is in fair demand. Turnings are difficult to move.

Scrap Joins Aerial Group

Pittsburgh, Oct. 3.—Sellers of iron and steel scrap, after a prolonged period of comparative quiet, at last are coming into their own. Heavy melting steel, which sold at $16 a ton not long since, now is commanding $17 and $17.50, delivered. Other grades are correspondingly strong. Demand is heavy. Nearly all the more important consumers have been figuring in the market and pending inquiries involve heavy tonnages in the aggregate. Dealers appear to have considerable stock on hand and the market is not nearly so excited as it would be under converse conditions.

Active at Cincinnati

Cincinnati, Oct. 2.—Dealers report sales of iron and steel scrap very satisfactory during the past week. Rolling mills are taking good tonnages, and a large number of foundries have discontinued the practice of buying from hand to mouth, and are taking fair-sized lots. No advances in prices have been made during the past two weeks, because the surplus available has been so much greater than demand, that it will take several weeks before the situation can be adjusted. Heavy melting scrap is quoted from $14.50 to $15, per gross ton, and No. 1 machine cast from $12 to $12.50, per net ton.

Strong at St. Louis

St. Louis, Oct. 2.—The scrap market continues strong in this district and the recent level of prices has been well maintained. Heavy melting steel especially is strong, and has sold as high as $18.25 a gross ton in this market. Rerolling rails are commanding top prices and railroad offerings have been falling off on this grade for the last few months. Consumers now are anxious for material, and this with recent light offerings has tended to greatly strengthen the market. The only railroad offerings before the market this week is an open scrap order list from the New York Central and about 300 tons of relaying rails and angle bars, offered by the Wabash.

Growing Shortage

Birmingham, Ala., Oct. 3.—Dealers in old material report that there is a growing shortage in scrap steel of all kind, and that they are buying all the available cast scrap at a lively "clip". In their judgment, within the next week or so steel scrap is due for a substantial advance in price, as well as a general alignment upward.

(For complete prices see page 708.)

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

WILLIAM G. O'MALLEY, master mechanic, Pittsburgh Crucible Steel Co., Pittsburgh, was appointed works manager of that concern, effective Oct. 1, and now has charge of all operating and construction work at Midland, Pa. Mr. O'Malley was born in Scranton, Pa., where he became an apprentice in the machine shop of the Dixon Locomotive Works. Upon the completion of his apprenticeship, he accepted employment with the Lackawanna Iron & Steel Co., at Scranton, and was subsequently made superintendent of the shops. Later, he was appointed general master mechanic of the entire plant. In 1900, when the Lackawanna Steel Co. built its plant at Buffalo, N. Y., Mr. O'Malley was directed to dismantle the old mills and erect new equipment. He remained in Buffalo until 1911, having been retained as general master mechanic after the construction work was completed. Mr. O'Malley had direct charge of the construction of the company's seven blast furnaces and the finishing mills. The erection of the last blast furnace, furnace No. 7, was completed in 142 days.

Mr. O'Malley became identified with the Pittsburgh Crucible Steel Co. at Midland, Pa., in 1911, and has since supervised the construction of the new buildings and the mechanical operation of the entire plant. He always has taken an active interest in civic work. While in Scranton, he was a member of the select council, served on the board of education, and on one occasion declined to be a candidate for mayor.

S. B. Patterson has resigned as superintendent of the properties of the Robesonia Iron Co., Robesonia, Pa., effective Oct. 1, after 12 years of service with the company. It is Mr. Patterson's intention to retire from active business and by so doing he brings to an end a long and active career of 52 years in the iron business. Starting as a clerk at the blast furnaces of Cooper, Hewitt & Co., Phillipsburg, N. J., in 1864, Mr. Patterson engaged in the manufacture of stoves at Phillipsburg, for a short period operated a coke furnace at Ironton, W. Va., and in 1881 was superintendent of the charcoal furnace of the Pine Lake Iron Co., Pine Lake, Mich. He then was recalled to the east to act as assistant superintendent of the Cold Spring furnace of the West Point Iron Co., West Point, N. Y. He left there to take charge of the Quinnemont furnace and coke ovens of the Pennsylvania & Virginia Coal & Iron Co., at Quinnemont, W. Va., where he remained for four years. In 1886, he returned to Phillipsburg, N. J., as superintendent of

WM. G. O'MALLEY

mines for the Andover Iron Co., which had purchased the furnaces of Cooper, Hewitt & Co., where he had been originally employed. Subsequently becoming superintendent of both furnaces and mines of this company, he remained until 1902, when the properties were sold to Joseph Wharton. In about a year he resigned to take a position with the Empire Steel & Iron Co., where he served as superintendent of one of its furnaces and subsequently as superintendent of mines and assistant to the treasurer. In 1904 he left the Empire company and was appointed superintendent of Robesonia furnace. Mr. Patterson will reside at 1340 Fairview street, Allentown, Pa.

J. W. Gocher, formerly of Johnstown, Pa., at present assistant superintendent of the furnace of the Robesonia Iron Co., Ltd., has been appointed superintendent of the company's furnace and mines, effective Oct. 1, succeeding S. B. Patterson, resigned. Mr. Gocher began his career in the iron and steel business in 1889, as a draftsman in the employ of the Cambria Steel Co. He became successively chief draftsman, assistant chief engineer and chief engineer of that company, and in 1912 was transferred to the executive department as consulting engineer and assistant to the president. In 1914 he left the Cambria Steel Co. to establish an office of his own in Johnstown as consulting engineer, in which capacity he became known to his present employers, and in April of this year accepted the position of assistant superintendent. Mr. Gocher will reside at Robesonia, Pa.

Paul J. Barnard, Minneapolis, has joined the Harvey Spring & Forging Co., Racine, Wis., as sales manager. Mr. Barnard formerly was associated with the Gas Traction Co., Minneapolis, and later with the Emerson-Brantingham Co., Rockford, Ill.

Byron B. Hamilton has resigned as assistant superintendent of the structural department of the Cambria Steel Co., Johnstown, Pa., to become works manager of the National Steel Car Co. at Hamilton, Ont. Mr. Hamilton was identified with the Cambria company about 20 years.

Sven Winquist, Gothenburg, Sweden, inventor of the S. K. F. ball bearing, recently inspected the Hartford, Conn., plant of the S. K. F. Ball Bearing Co., and was so well pleased with conditions that he gave the employes a holiday, Sept. 30, with full pay, as on working days. Mr. Winquist is head of the Swedish plant, which employes 2,500 men, and is a trustee of the Hartford branch.

W. E. Woodward, of Schenectady, N. Y., today became vice president of the Lima Locomotive Corporation, and W. M. Myers, former manager, was promoted to the position of assistant to the president, an office just created. O. J. Smith, of New York, who has been with the American Locomotive Works for 16 years, is the new manager. Mr. Woodward has been assistant chief engineer with the American Locomotive Works.

Coke Supply

Is Affected by Car Shortage—Conditions in Central West

Chicago, Oct. 3.—Shortage of cars for transportation of coke is causing some shortage of furnace fuel in this section, though no distress has followed yet. Most blast furnaces in the west have their own by-product plants and are independent of cars for bringing their coke, although coal must be provided, and as the lack of transportation facilities becomes more acute there may be some trouble in this direction.

Foundries for the most part have good stocks, as they burned less than had been expected through the summer and early fall, due to lack of labor and the unusually heated period of July and August.

Prices Advance Sharply

Pittsburgh, Oct. 3.—Heavy demand for bituminous coal, a more serious shortage of railroad cars, a scarcity of labor and an unexpected increase in demand for beehive oven fuel have combined to strengthen materially the market for Connellsville coke. Bituminous coal has sold at as high as $2 a ton at the mine. Coke shippers declare that it is increasingly difficult to obtain cars and no relief in the situation is expected until the closing of the lake navigation season. Demand for beehive coke, notwithstanding further additions to retort oven batteries, has been heavier, however, than expected.

Forty-eight hour coke for shipment next year has sold at as high as $3.25, ovens; one lot of 7,000 tons and another of 5,000 tons commanded that figure a few days ago. For prompt delivery, some fuel has sold at more than $3.75, ovens. Pending inquiries for contract fuel involve about 40,000 tons a month. The Andrews & Hitchcock Iron Co., Hubbard, O., is negotiating for 24,000 tons a month for shipment the first six months of next year. The Youngstown Sheet & Tube Co., which owns the Hubbard furnaces, apparently cannot supply them with by-product coke. Foundry coke also reflects strength, but not enough activity has been enjoyed to definitely define prices. Dealers are asking $3.75, ovens, and above. The Connellsville Courier for the week ending Sept. 28, says production was 404,600 tons, compared with 393,447 tons the week before.

Car Shortage

St. Louis, Oct. 2.—A shortage of box cars crippled shipments of by-product coke to the metallurgical trade last week. Inquiries are becoming more numerous, and several large sales of the local product were made at advanced prices. The local output of foundry coke has been sold on contracts, and inquiries for prices on this grade are being turned down.

Car Buying

Was More Active in September—Little Rail Business.

New York, Oct. 3.—September was the best month of this year in car buying, with the exception of January, and carefully-compiled records show that not less than 14,500 cars were placed in the former period. This compares with 2,300 in August, 2,600 in July, 5,100 in June, 4,500 in May, 7,000 in April, 8,750 in March, 12,900 in February and 21,700 in January. The September figures may fall somewhat short of the real total, for there are reports that the New York Central lines have placed a larger number than they have been credited with, and these yet await confirmation. A 4,000-car order for Russia was included in the September awards.

Rail orders in September were unusually light and consisted chiefly of filling-in lots for domestic roads and some new export orders, the total of which did not exceed 50,000 tons.

Car Buying Continues

Chicago, Oct. 3.—Railroads are continuing to place orders for additional cars, although the past week did not see as heavy buying as the preceding week. The Chesapeake & Ohio railroad has bought 1,000 steel hoppers from the Pressed Steel Car Co., the Missouri Pacific railroad has bought 1,500 general service cars from the American Car & Foundry Co., the Nickel Plate railroad has bought 500 automobile cars from the Western Steel Car & Foundry Co., the Milwaukee Coal & Gas Co. has bought 300 gondolas from the American Car & Foundry Co. and the Chicago & Alton railroad has bought 200 gondolas from Haskell & Barker.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Oct. 3.—Good buying characterized the metal markets during the past week, although of somewhat smaller proportions than that of the preceding period. Demand for copper was steady, but rather a disappointment to sellers, in view of the recent large tonnage placed by the allies; in this respect the current copper market following this large order has been unlike the markets following the other large contracts. However, the copper market is strong with sellers optimistic, as the result of a steadily increasing volume of inquiry both from domestic and foreign sources. Italy is expected to close shortly on a large tonnage of copper. Electrolytic now may be quoted as follows: Prompt and October, 28.50c to 29c; November, 28c to 28.50c, December, 27.50c to 28c. Prime lake copper quotations follow: Prompt and October, 28.25c to 28.75c; November and December, 27.75c to 28.25c. Casting copper is held at 26.50c to 26.75c for prompt delivery; 26.25c to 26.50c, October; 26c to 26.25c, November.

Demand for spelter has been fairly heavy and prices have been advanced. The buying has been from miscellaneous sources, both domestic and foreign consumers closing on a fair volume of metal for delivery in practically all positions, especially late this year and early next year. Prime western may be quoted as follows: Prompt, 9.50c, St. Louis; October, 9.37½c to 9.50c; November, 9.25c to 9.37½c; December, 9.25c; and first quarter of next year, 9.12½c. Demand for brass spelter continues in poor volume although prices, reflecting the strength in prime western, have been advanced and now are holding at 10c to 10.25c, St. Louis, for prompt shipment.

The lead market has been comparatively quiet, although very firm. The scarcity of metal for nearby shipment still prevails and prices, reflecting this condition, are higher. Many of the large producers are out of the market for delivery before November and several producers are now only able to sell but small amounts for that month. The outside market may be quoted today as follows: New York, 7c to 7.12½c; St. Louis, 6.85c to 6.90c. The American Smelting & Refining Co. still is asking 7c, New York, and 6.92½c, St. Louis. However, an early advance by this interest is expected by many in the trade.

In the outside aluminum market, inquiries from domestic consumers appeared in good volume for virgin ingots for prompt and nearby shipment. However, business has been impeded by a shortage of this material and the market as far as actual buying is concerned has been quiet. But little demand is in evidence for other grades. Prices in the outside market are about as follows: No. virgin ingots, 61c to 62c; No. 1 remelted 59c to 60c; No. 12 alloy 47c to 48c.

The situation in antimony is practically unchanged. Buying has been principally from domestic consumers for small lots, involving from five to 10 tons each. Wah Chang's W. C. C. brand and domestic brands may be quoted 11.50c to 12c, duty paid New York.

The tin market has been strong and prices have tended upward. Inquiry has been coming out in much better proportions and considerable business has been booked for practically all positions. Straits tin for prompt and nearby shipment is now being held at 39.37½c to 39.50c, New York.

(*For complete prices see page* 708.)

The Grinding of High Speed Steels

Cutting Tools of High Speed Steel May Easily Be Ruined in Grinding—The Author Explains the Causes of Grinding Difficulties and Suggests a Remedy

BY C. E. GILLETT

THAT the heat generated in grinding does not affect the temper of high speed steel, is a rather prevalent idea. This opinion is derived from the fact that cutting tools made of this material will stand up and maintain their cutting edge under a red heat which would render a carbon steel tool useless. The fact is, high speed steels can be ruined as easily by grinding as the ordinary carbon tool steels.

High speed and self-hardening steels may contain tungsten, chromium, manganese, molybdenum, titanium or other elements, combined with from 0.40 to 2.20 per cent carbon. Tungsten influences the rate of hardening and the depth to which the hardening effect penetrates below the surface. It also resists the formation of a large crystalline structure, and hence produces a keen and durable cutting edge. Chromium produces a very hard steel with a high elastic limit. The combination of tungsten and chromium is responsible for the remarkable properties of the modern high speed steels. Manganese is used to toughen the steel without reducing the hardness. Molybdenum has properties very similar to tungsten, 1 per cent of the former being equivalent to 2 per cent of the latter. Steels treated with titanium show greater resistance to abrasion and heat up more slowly from friction than steel not similarly treated. Many tools which are supposed to have been spoiled by grinding are not properly heat-treated. If the tools, when carefully reground, are still in poor condition, the chances are that the heat treatment is at fault. In grinding high speed steels it is necessary to observe numerous precautions which are not necessary with the carbon steels. Lighter cuts, slower speeds and traverses are usually necessary, although cases have been known in cylindrical grinding where it was necessary to use the very high work speed of 260 surface feet per minute in order to avoid burning and cutting edges of an inserted tooth mill. This fast work speed was probably necessary because the wheel in use was too hard. The greatly increased work speed resulted in an increase in the grain depth of cut, which in turn caused the wheel to act softer. This, however, is an unusual case. In most instances a low work speed is preferable.

Undoubtedly the most discussed point in the grinding of high speed steels is with respect to the use of water. At first all of these steels were ground dry. Later some more courageous than the rest, advocated grinding wet. The superintendent of one of the largest small-tool manufacturing concerns recently stated that it was a crime to grind high speed steels dry. In wet grinding, a liberal supply of water must be available. The tools being ground should be flooded with water.

A Norton special service man was called in recently by a firm manufacturing a machine for grinding a special type of high speed steel tools. A saucer wheel, mounted on a vertical spindle, was being used to grind a broad, flat surface. A ¾-inch gas pipe and rubber tube directed the water on to the back of the wheel, whence it flew off by centrifugal force without striking the work. Naturally considerable trouble was experienced on this operation. The special service man recommended that more water be directed between the wheel and the work. This was done and the results obtained were astonishing. A second connection was made whereby water could be directed onto the work from both sides. From a near-failure the machine was converted into a practical commercial proposition. Today this machine is being sent out equipped with two 1-inch water pipes in place of the original ¾-inch hose used, and all brands of high speed steel can be ground successfully. This undoubtedly is on account of the liberal supply of water now available.

It is necessary, in many cases, to grind dry, and if care is not taken, skin softening will result. Skin softening is the softening of a very thin layer on the surface of the tool being ground. It may be detected by passing a file across the suspected section. The file will take hold of a softened portion of the surface. However, a second pass of the file in the same place will usually show that the soft skin has been removed and that the hard stock has been reached. Lathe tools, drills and cutters burned in grinding, or skin softened, generally can be redeemed by grinding off 1/64-inch to 1/32-inch of the burned section. In dry grinding formed tools made of Styrian steel, hardened and tempered, a Brown & Sharpe universal machine was used. It was noticed that burning always re-

FIG. 1—TOOL STEEL BLOCK, DRY GROUND AT HIGH SPEED, SHOWING SURFACE CRACKS

From "Grits and Grinds," published by the Norton Co., Worcester, Mass.

sulted if grinding was from the body to the point of the tool. However, in grinding from the point to the body, this trouble was eliminated. In the latter case, the heat is driven ahead of the wheel onto the body of the tool, which has a greater capacity for holding the heat generated.

Causes of Cracking

Checks and cracks are very easily obtained on some types of high speed steels, if great care is not observed. This is possible with both wet and dry grinding, but more prevalent with dry grinding. An easy way to produce checked tools is to grind dry and occasionally dip the tool into a pail of water.

Fig. 1 shows a photograph of the surface of a block of double special tool steel, ground dry with a soft wheel and fairly light cuts at high speed. The cracks run in all directions and in several places it is seen that a layer of metal has split away from the body underneath. Fig. 2 shows a heavy crack formed on a similar block of high speed steel. A soft wheel was used in this case, taking a cut of 0.001 inch per pass. It will be noted that the top of the block was badly burned in places and small surface cracks or checks were formed. The heavy crack seen on the front side and end of the block opened up fully 1/32 inch. Both blocks were finally ground, using a fairly coarse, very soft wheel with a slow table traverse and a cut of 0.0005 inch.

Still another method of grinding is to heat the high speed tools to a temperature at which they are used under normal working conditions. Such grinding necessarily must be done dry.

Wheel speeds are very important. It is a well known fact that wheels will act harder at higher speeds. For general grinding, most abrasive wheel manufacturers recommend a wheel speed of 5,000 surface feet per minute. At the suggestion of a Norton special service man, one concern manufacturing high speed steel tools reduced the wheel speed on a certain operation to from 4,500 to 4,700 surface feet per minute. At once several of the difficulties experienced were eliminated. As a result every grinding machine of a cylindrical, universal or special type was changed over to a lower wheel speed. Production was increased 25 per cent and the wheel cost was decreased 33 per cent through the use of slightly harder wheels on the work.

The properties of high speed steel are such that wheels which will grind without burning or checking are considered too soft, when the comparison is based upon the life of wheels used for grinding carbon steel tools. However, it should not be forgotten that the greatly increased production obtained with high speed steel tools is due in a large measure to the fact that it is possible to do a greater amount of work without regrinding the tools. A careful investigation of this point by wheel users will show them that the wheel cost per unit of production has decreased.

The artificial aluminous abrasives of special temper, known as No. 38 alundum and No. 26 alundum, make the best wheels for grinding high speed steels. The wheels must generally be of coarser grit and softer grade than is used for similar work on carbon steel. Coarser softer wheels cut faster and cooler. However, grit of too coarse a size will not leave a good finish on the tool, the cutting edge being rough and irregular. For cylindrical work, finer, harder wheels can be used, but for broad flat surfaces a

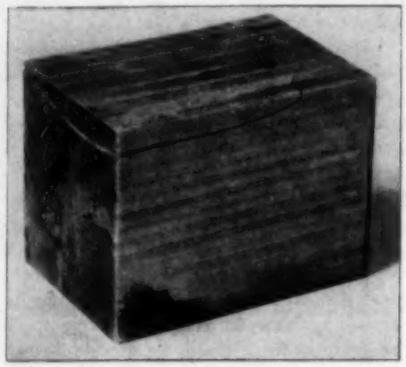


FIG. 2 — CRACK PRODUCED IN HIGH SPEED STEEL BLOCK BY A SOFT GRINDING WHEEL

very much coarser, softer wheel is necessary.

The best results are always obtained when the wheel is running true. Wheels for tool and cutter work should always be dressed with a diamond, care being taken not to use too dull a diamond or to dress the wheel too fine. As soon as the wheel starts to glaze and heat the work, it should be dressed again. Two or three passes of the diamond are sufficient to produce a good free cutting wheel face.

The grinding of high speed steels commences immediately after the mold has been drawn from the castings. The surface of the billet usually contains seams, cracks or blister marks. It is necessary to grind out these blemishes prior to rolling the steel into bar form or poor material will result and considerable of the stock may have to be rejected. The action of a seam or crack in high speed steel is similar to the piping in billets used for steel rails and other heavy shapes. These billets of high speed steel are ground either on a floor stand, or with a swing frame grinder, according to the weight of the piece. For floor stands carrying wheels up to 16 and 18 inches in diameter, grains 16 to 24, grades P to R give very good results; while for swing frame grinding employing wheels to 24 inches in diameter, grains 12 and 14, grades R and harder are used. The wheel speeds in general average from 5,000 to 6,000 surface feet per minute.

Types of Wheels to Use

Practically all grinding of drills, reamers, milling and formed cutters and similar tools is done wet. For the cylindrical grinding of drill and reamer shanks on Norton, Brown & Sharpe and Morse machines, wheels 3,846 to 3,860, grades K, L and M are used. Universal or tool and cutter grinding machines of Norton, Brown & Sharpe and Cincinnati types are used for backing off reamers and sharpening milling and gear tooth cutters. The wheels generally employed when grinding in large quantities are of No. 38 or No. 26 alundum in grains 36 to 60, grades H to J, made by the silicate process, or grades 1 to 2½, made by the elastic process. For grinding in small quantities or regrinding on machines of the same types, grains 36 and 46, grades J and K, No. 38 and No. 26 alundum are generally employed.

The surface grinding of high speed steel presents considerable trouble, and grains 36 and 46 of No. 38 and No. 26 alundum, grades H and I silicate process are most successful. Several brands of steel, such as Styrian, Bohler's gold label, Halcomb's double special and Sanderson's double special, have to be worked very carefully. Slow speeds and light feeds are absolutely necessary. Wheels of grain 3,830 through 3,846, in grades H and I, silicate process, are very successful.

Vertical spindle machines of the Pratt & Whitney and Walker types, carrying cup and cylinder wheels, give the best results with coarse, very soft wheels, such as 3,830, grade G silicate.

For the off-hand grinding of lathe and planer tools on floor and bench stands, grains 24 to 30, grades N and O, made both by the vitrified and silicate process, work well.

Owing to the hardness of many high speed steels, it is impossible to cut off small pieces of stock ¼ inch to ¾ inch square for lathe and planer tools in the usual way. Thin wheels up to 12 inches 3/32 inch are in great demand for cutting off work, being 30 to 36 grade 8, vulcanite process. Where care must be exercised

with respect to burning, 46 and 60 grades, 4 and 5 elastic process are employed. A good average for cutting off 5/8-inch square stock with a vulcanite wheel is 15 seconds per cut; for 1/2-inch and 3/4-inch stock with an elastic wheel, the time is 10 and 20 seconds per cut, respectively.

Many manufacturers are trying to grind high speed steel and carbon tools under the same conditions and with the same wheels. Naturally this is possible, but such methods cannot secure the greatest efficiency. It is better to have two sets of wheels and to use each for the particular material whereon it is most efficient. The greatest obstacle encountered in this respect is the disinclination of the operators and foremen to be continually changing wheels. In the small shops the time necessary to change wheels would not be a serious factor. In the large shops a little study and conscientious effort can readily effect a grouping of machines and routing of the work which will bring forth the best results in the grinding of both materials, and will effect a saving in the operating costs.

All-Geared Head for Screw Machine

BY OSKAR KYLIN

AN ALL-GEARED head for the Foster screw machine is about to be put on the market by the Foster Machine Co., Elkhart, Ind. This device has been manufactured to meet the increasing demand for single-pulley drive screw machines. This type of drive is believed to possess the added advantages of instantly obtaining speed changes in the geared-head machine, and increasing the pulling power. It is claimed that a very much higher belt speed can be employed in this style of a head than with the usual type.

An interesting feature in regard to the design of this head is the unit principal of design employed, the head itself constituting a new unit made to fit the Foster screw machine. The cone in the standard back-geared machine is replaced by a three-gear cluster mounted on a sleeve, journaled on the spindle. This gear cluster is arranged to engage a triple sliding gear cluster mounted on a shaft directly above the spindle, as shown in Fig. 1. This shaft is journaled in bronze boxes carried by the main head casting. The operation of the sliding gear cluster is accomplished through the use of a rod and a hand lever. On the same shaft is mounted two gears with cone type friction, arranged to engage either of these gears. The purpose of this friction is to stop, start and reverse the machine. One of these gears is engaged by the reversing idler, mounted beneath the main driving pinion. The driving pinion is securely mounted on the pulley shaft journaled in bronze boxes held by the main head casting. The reversing friction clutch is operated by means of the lower horizontal lever shown in Fig. 2.

For driving this geared-head machine, a 2½-inch belt on a 10-inch pulley is employed. The speed of the pulley is 900 revolutions per minute, giving a belt speed of 2,350 feet per minute. A single belt under ordinary shop conditions can deliver 6.2 horsepower to the machine. The reversing friction in the head is said to be powerful enough to pull a heavy load without slipping.

The machine is equipped with a 2-horsepower General Electric 1,800 revolutions per minute motor mounted on a leg. The high belt speed employed makes it possible to use a high-speed motor with a small frame. A decided saving in the cost of the motor is effected in this manner. Attention is called to the method of guarding the belt at the motor as well as on the machine. This tool may also be driven from a line shaft through the medium of a plain tight and loose pulley countershaft. Fig. 2 shows the machine equipped with a 3-jaw geared scroll chuck capable of swinging clear of the cut-off slide. Six speed changes are obtainable in the geared head. They are arranged in geometrical progression, ranging from 34 to 466 revolutions per minute. These speeds are indicated, together with the corresponding movements of the levers, on the speed chart mounted on the head of the tool, as shown at the left of the illustration.

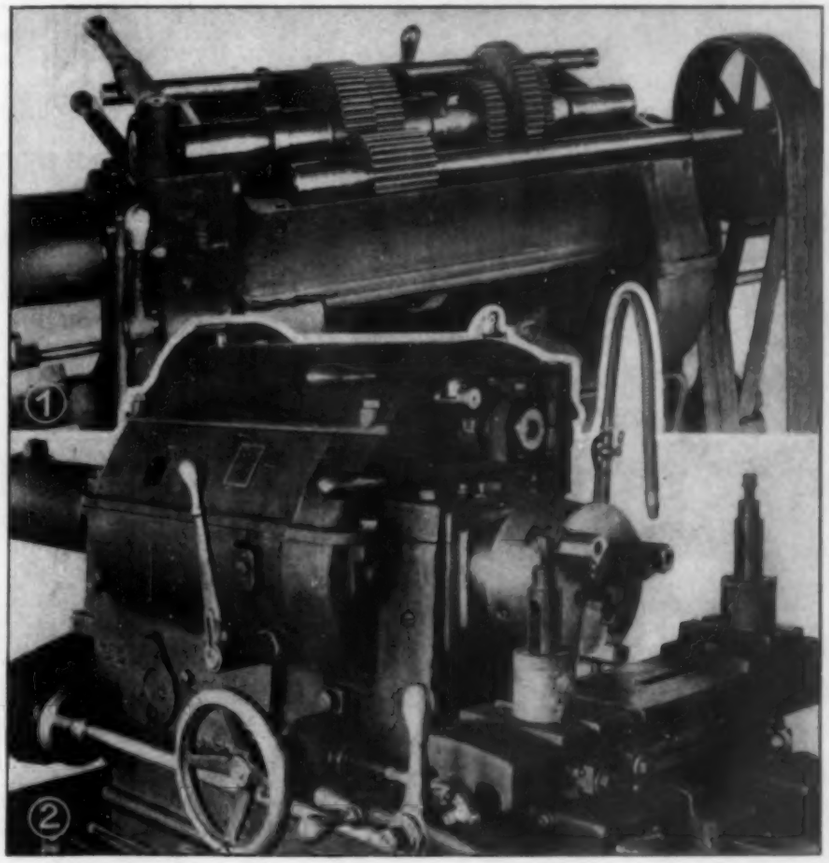


FIG. 1—VIEW OF HEAD SHOWING GEAR CLUSTER AS WELL AS MOTOR DRIVE ATTACHMENT. FIG. 2—ALL-GEARED HEAD FOR NEW SCREW MACHINE. CROSS SLIDE IS EQUIPPED WITH HAND LONGITUDINAL AND POWER CROSS FEEDS.

New Switches for Controller Work

The Increasing Use of Electricity is Making New Demands Upon the Ingenuity of Engineers—The Problem of Proper Control for Heavy-Duty Machinery Appears to Have Been Solved

THE problems of designing and constructing electrically operated switches for controller work are entirely different from those encountered in the manufacture of switches used in central stations on switchboards. Electrically operated switches for switchboard work, commonly known as circuit breakers, do not operate frequently and therefore the parts are not subject to severe wear. In such cases it is possible to use relatively complicated driving mechanisms with many parts without decreasing the reliability of the apparatus. On the other hand, switches used for motor controllers have to operate very frequently, in some cases as often as once every second, and the wear on the parts during operation becomes a very important consideration. The number of parts of these switches has to be reduced to a minimum, and to wear well the parts have to be made relatively heavy. This increases the inertia of the moving members and has a tendency to reduce the speed of operation, which is of greatest importance where heavy currents are to be handled. The increased inertia of the parts is another reason for reducing of the number of moving parts.

Direct current circuit breakers for low voltages have been successfully built for solenoid operation up to the large capacity of 10,000 amperes. The energy required by direct-current solenoids is relatively small and in the case of the 10,000 ampere switch, the total energy consumed was only approximately 100 watts. Direct-current solenoids can be built substantially and have sufficient speed for operation of circuit breakers of large capacity. However, when we come to the operation of such switches with alternating currents, we meet a new problem.

Difficuties With Alternating Current

In direct-current magnets the only energy consumed is that required by the coil of the magnet. In alternating current magnets, however, we have not only the current consumption of the coil windings, but also the energy loss due to hysteresis and eddy currents in the iron core. These losses are of greater magnitude than the losses in the windings, and to keep them within reasonable limits, the iron structure of the magnet must be laminated. This naturally weakens the magnet where the greatest strength is required. Also, the larger the magnet, the smaller, proportionately, is the radiating surface through which the heat, due to these losses may be dissipated, and therefore a limit is reached beyond which alternating-current magnets cannot be built to operate successfully under very severe service. Alternating current magnets have a tendency to be noisy, due to the pulsating pull of the magnet. A relatively large current is consumed when the circuit breaker is open. This current is reduced automatically when the magnet seals, but the current limiting apparatus used in the magnet coil must carry very heavy currents when starting the motor, and is therefore subjected to severe wear.

For these reasons, large switches

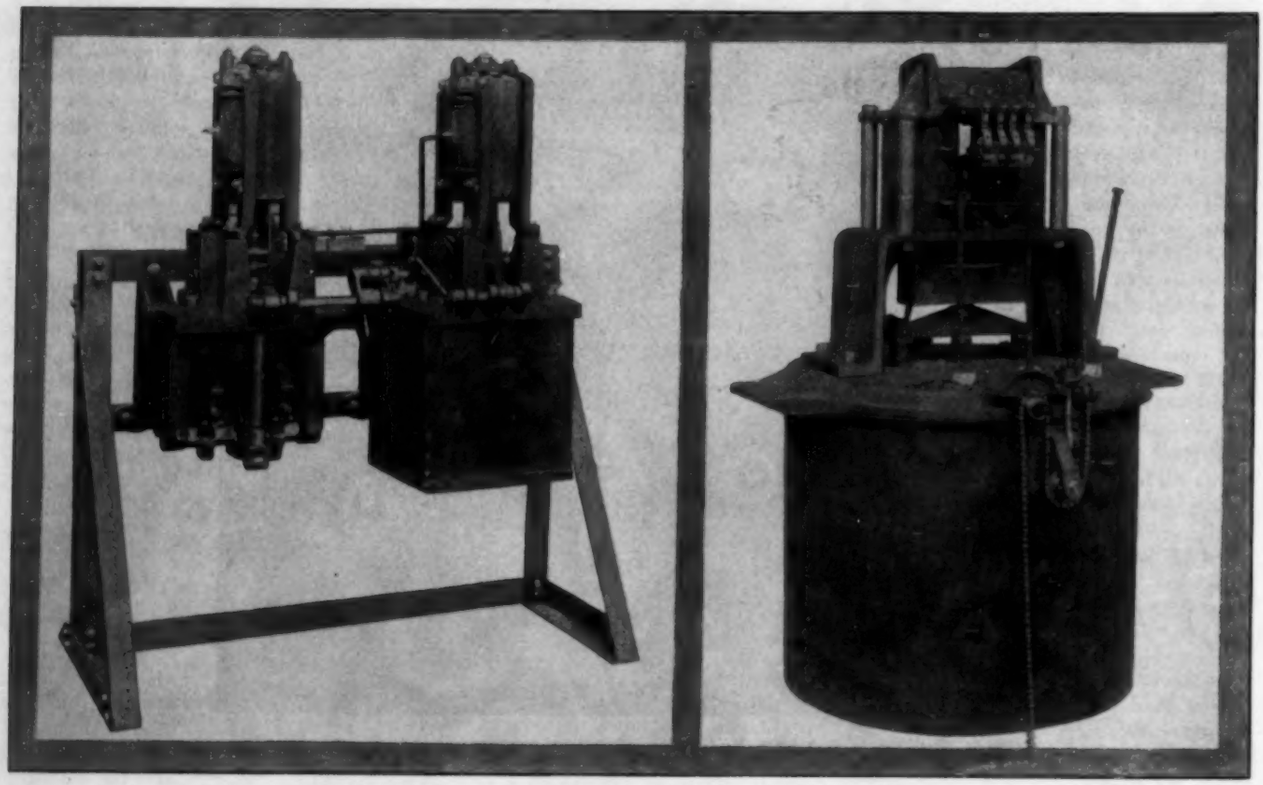


FIG. 1—OIL UNIVERSAL SWITCHES OPERATED BY ALTERNATING-CURRENT MAGNETS

FIG. 2—ALTERNATING-CURRENT SWITCH OPERATED BY DIRECT-CURRENT MAGNETS

for controling alternating currents have not been built with alternating-current magnets. Another additional reason is that larger alternating-currents at high voltages are most effectively handled by switches of the oil-immersed type.

For small currents under low pressure, which can be handled in air satisfactorily, air-tight switches of the clapper type have been developed and have operated successfully for several years. Small oil-immersed switches for voltages up to 2,200 and relatively small currents may also be handled by alternating current magnets, such as are shown in Fig. 1. For larger switches, however, the alternating-current solenoid has not proved satisfactory, due to the disadvantages mentioned previously; therefore it is necessary to operate such switches with a direct-current magnet supplied by a separate source of energy. Such a switch is illustrated in Fig. 2. It has a capacity of 500 amperes at 6,600 volts. In many installations where alternating current switches are to be employed for controller work and direct current is not available, it is necessary to install a motor-generator set. This increases the expense and adds another link to the installation which is liable to break down. The motor-generator set also requires some attendance, which adds to the operating cost of the installation. The motor-generator set, or even an independent source of direct current, makes the installation somewhat less reliable because the alternating current circuit cannot be controled if the direct current supply should fail. For these reasons it seems desirable that alternating current switches of large capacity should be operated directly or through a stationary transformer from the alternating current source of supply. This is believed to have been made possible by the use of motor-operated switches recently developed by the Cutler-Hammer Mfg. Co., Milwaukee. The principle of operation of these switches is to connect the motor armature by means of a lever and crank to the operating mechanism of the switch and to have the motor energized during the period of closing the switch so that the switch opens on no-voltage. Formerly, switches with motor operation were constructed so that the motor circuit was cut out after the switch was closed and the switch tripped by a separate tripping mechanism. Such switches while admirably adapted for central station work are not believed to be suitable for controller work on account of the great complication which brings with it all the disadvantages enumerated above. Also such switches would be entirely too sluggish in operation for rapid controller work.

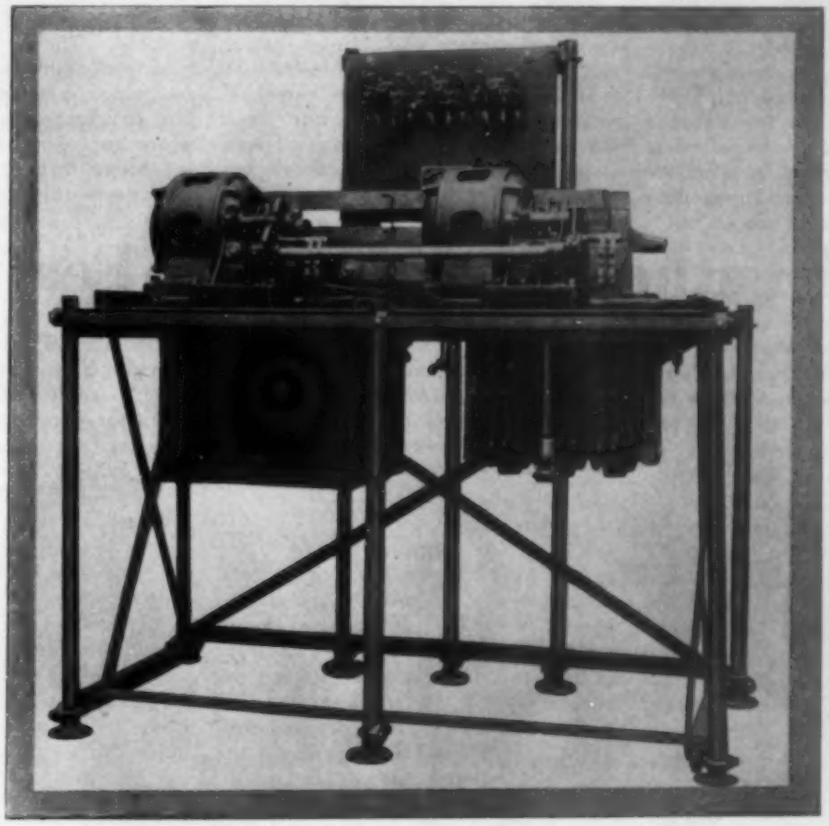


FIG. 3—NEW TYPE OF MOTOR-OPERATED OIL REVERSE SWITCH

To operate the switch directly from the motor armature by means of a crank would require a motor of very large proportions, due to the large torque required. Furthermore, such a motor would consume considerable energy, and in view of the fact that the motor armature stands still during the entire time during which the switch is closed, with exception of the short interval required for closing, it would be difficult for the motor to dissipate the energy which is developed. The simplest type of motor, however, can be used for such an installation, namely, a squirrel-cage motor, which requires nothing but a line connection.

In order to reduce the size of the motor, the armature may be geared to the operating mechanism in such a manner that it makes several revolutions for the closing of the switch. This reduces greatly the size of the motor and obviates the difficulties stated. There is, however, one difficulty to overcome. The armature after having made several revolutions attains quite a momentum and when the switch is closed it must stop immediately. With no provision for this there would be produced a considerable strain on the motor shaft and the gearing which would lead, after a relatively short time, to destruction of the apparatus. The inertia of the armature must be gradually absorbed outside of the positive stop on the switch without cutting off the power supply from the motor. Similarly, when the switch is opened, the armature revolves backwards due to the tension of the operating mechanism. This tends to retard the action of the switch and when the switch reaches its open position the armature, if coupled tightly with the operating mechanism, produces another shock on the mechanism and gearing when stopped. The new Cutler-Hammer switches are designed to obviate these troubles. The armature is connected with the operating mechanism by means of a pinion-and-gear sector, but instead of being keyed directly on the shaft of the motor, the pinion is connected with a slip clutch, which is set for a maximum torque slightly in excess to the torque developed by the motor at standstill. When the motor is first energized the armature is accelerated and in moving it drives the operating mechanism through the slip clutch, closing the switch. When the switch parts reach their ultimate limit the operating mechanism is stopped in a suitable manner, while

the motor armature continues to revolve, causing slippage of the clutch, which absorbs gradually the inertia stored up in the armature, until the latter comes to a standstill and keeps the switch closed. When the circuit to the motor is opened, the switch members which are under tension, accelerate the armature backwards and when the maximum opening of the switch is reached the switch members are stopped in a suitable manner and the armature is free to rotate through the slip clutch. The slip clutch, therefore, is installed to prevent over-straining of the operating members of the switch.

The motor is designed to develop maximum torque at standstill, resulting, therefore, in the smallest possible motor for the work in question. The motor armature is built as light as possible to reduce the inertia effect and to permit of rapid acceleration in either direction so as to produce a rapid closure and opening of the switch. The armature shaft is supported on ball bearings. Particular attention is called to the slip clutch, which is built with an asbestos lined friction face. Switches of the type described may be built in any capacity. Fig. 3 shows a 3-pole type built to handle currents of 1,000 amperes per phase, where two such switches have been combined for reversing the primary of the motor circuit which is to be controled. In this case they are mechanically interlocked in such a manner that one switch can only close after the other switch is fully opened.

The contact parts of these switches consist of copper leaf brushes, which are protected by solid metal block auxiliaries. The contacts are arranged so that they separate in a horizontal plane producing a horizontal arc which is easily extinguished by the oil. Each leaf of the copper brushes forms a probable line contact, making it impossible for an oil film to produce a high resistance between the contact plate and the copper leaf brush. On the other hand, the heavy metal block auxiliary contacts have a great cooling effect on the arc, causing it to be rapidly extinguished, and in order to prevent an oil film from producing a high resistance between the auxiliaries, which would cause sparking of the main brushes, the two contact blocks engaging with each other are slotted diagonally, the slots on the two blocks crossing at right angles so as to permit the pressure exerted on the blocks to remove the oil film as rapidly as possible. The contacts are enclosed in an oil tank which is removable and which is supported from the cast iron structure which also supports the motor and operating gear. The leads are brought out through the top of the case to afford easy wiring.

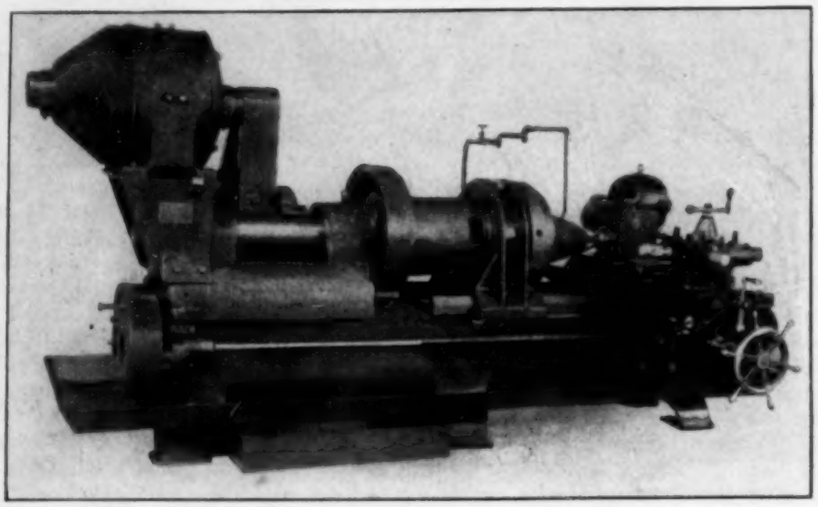
Shell Lathe Has Improved Features

THE Gisholt Machine Co., Madison, Wis., has developed a new machine for taking the finish boring and facing cuts, and also for milling the threads, in the base and nose of shrapnel shells. This new-type lathe is designed to cut right or left hand threads, either U. S. standard or metric, interior or exterior. The accompanying illustration shows one of these lathes which has a nominal swing of 25 inches with a 10-foot bed. This machine is built to handle shells up to 12 inches in diameter. A larger machine is being built to turn out shells up to 16 inches in diameter.

It is pointed out by the builders that shells may be bored, faced and threaded on this new lathe without rechucking the work. This feature eliminates any liability of imperfect threads. Rigidity of construction is said to make the machine especially capable of handling shell work. The collect chuck is supported at its outer end by a heavy steady rest and is driven from a spiral pinion on the back gear shaft engaging with a spiral gear secured to the collect chuck flange. This, in turn, is secured to the ends of the spindle nose. The end thrust of the spindle is carried by a ball bearing against the rear housing. The drive from the motor to the back gear is through a silent chain.

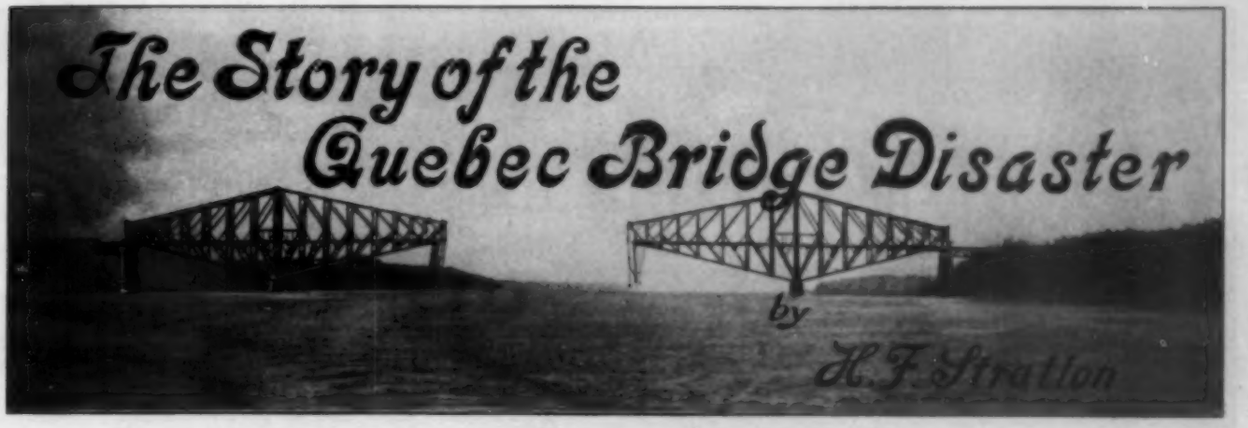
The spindle speed is reduced to the proper speed for milling the thread at one revolution of the spindle by special back gearing through worm and worm wheel. A headstock lever is used to effect the change from the regular boring and turning speed of the spindle to the slower speed provided for milling. Change gears are furnished to give latitude in speeds. Three rates of quick change feeds are provided at the headstock end of the lathe in addition to the usual change gears for obtaining various feeds and for the threads required for the screw cutting operations.

The tool post is of cast steel and is mounted on the front of the cross slide. It is designed to carry several different sizes of boring bars. The thread milling attachment is mounted on the rear of the cross slide and has a radial adjustment for aligning the spindle of the tread milling attachment with the lathe spindle. The thread milling spindle is carried on adjustable, bronze, taper bearings and has thrust washers and an adjustable collar designed to permit unusually simple adjustment to prevent back lash. This spindle is driven by worm and worm wheel from a small motor mounted on a cross slide. A hob arbor is fitted to the spindle. The front end of the cross-feed screw is furnished with an adjustable cam for feeding in the hob to the correct depth of the thread before the main spindle commences to revolve.



SPECIAL LATHE WITH THREAD-MILLING ATTACHMENT

The Story of the Quebec Bridge Disaster



by H. F. Stratton

Fig. 1—View of Bridge from East Side of the Cantilevers Saturday Morning

I WAS in a group of about 20 spectators who, in addition to the workmen, were on the outermost end of the north cantilever when the center span fell into the St. Lawrence river. While deeply sympathizing with the loss of life and property, this thing sticks in my memory as a gigantic spectacle rather than a tragedy, probably because we on the bridge were busy attempting to save ourselves, while those on shore saw men falling through the air and some felt the fear that friends and relatives had been killed.

The general specifications of the bridge are well known. The weight is 70,000 tons; extreme height above river, 350 feet; clearance at high tide, 150 feet; total length of span, 1,800 feet; length of suspended center span, 640 feet; and cost of bridge, $17,000,000. The center span which had been built at Sillery Cove, three miles away, was to be floated on barges to its position and then lifted 150 feet to its final place in the bridge.

Fig. 1 shows the bridge Saturday morning with the hoisting arrangements hanging from the outer ends of the cantilevers. These comprised on each cantilever, a pivoted mooring truss —which appears like a small steel bridge hanging from its end—and four lifting chains made of steel links pierced with holes every six feet. The lifting was to be done by eight hydraulic jacks operated at a pressure of 4,500 pounds.

The bridge is at Neilsonville, about nine miles from Quebec, and Sunday night was spent there to get an early start. All weather signs were anxiously watched because a heavy wind would mean postponement or disarrangement of plans. The bridge company had kept accurate records of weather for five years to assist in making its own forecasts. A storm detector was in use

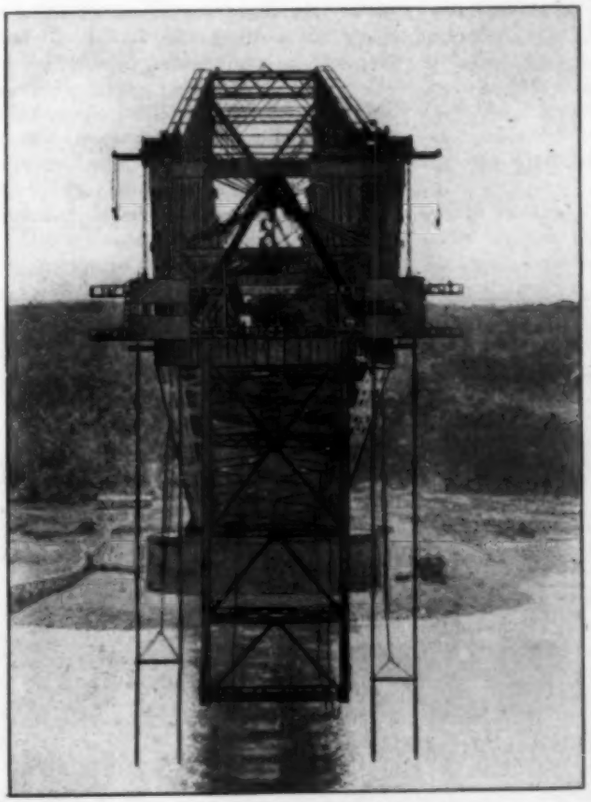


FIG. 2—THE END OF THE SOUTH CANTILEVER PHOTOGRAPHED FROM THE END OF THE NORTH CANTILEVER ON SATURDAY MORNING

FIG. 3—VIEW FROM THE OUTER END OF NORTH CANTILEVER LOOKING TOWARD SHORE AND SHOWING THE REMARKABLE INTERIOR BRACING

FIG. 4—LIFTING THE SPAN AFTER THE EBBING TIDE HAD TRANSFERRED THE WEIGHT OF THE SPAN FROM

which would indicate a thunder storm within 40 or 50 miles. The barometer had not dropped. The only unfavorable indication was a slight east wind and some light clouds which occasionally partly obscured a full moon.

About 1 o'clock Monday morning, at low tide, the valves were closed in the barges which were to bear the center span. As the tide rose the barges floated and at 4 o'clock the span rested on the floating barges. At 5 o'clock eight tugs had pulled the span out into the river to commence its three mile trip up stream. A slight current due to the incoming tide, assisted the tugs.

At the bridge site, the scene was dramatic. The cantilever arms reached out toward each other with their still unspanned gap one-eighth of a mile long. The river surface was brilliantly colored by the rising sun. Occasional banks of mist drifted slowly westward; through one of them the span was emerging with the sun back of it and shining through part of it. A hundred thousand tense spectators watched from boats and the river banks which rose sharply to a height of several hundred feet.

At intervals of 300 feet on each shore, ranges had been located so that the span could be kept parallel to the bridge while nearing its destination. Two balloons hung from wires, marked the line passing through the center of the gap between the cantilevers at right angles to the axis of the bridge. Two trial stops were made to determine how far the span would drift by its own momentum.

About 6:30 a. m. the span was floated to position; the mooring trusses which had been pulled back, were lowered, and in about an hour the attaching of the span to the mooring trusses was completed. The hanger chains were swung to position about 8 a. m. and by 8:30 the pins had been slipped home, connecting the span to the hanger chains.

The first act, considered by many the most hazardous, had been finished with an apparent ease which made it look simple. The great center span, heavy and cumbersome as it was, had been towed to position and was now connected to the cantilevers from which it was designed to hang. The whistles, heretofore solicitously kept quiet not to interfere with the work, now loudly screamed their acclaim; the crowds cheered, and those familiar with the work congratulated each other that the most dangerous job was done.

As yet the barges still supported the

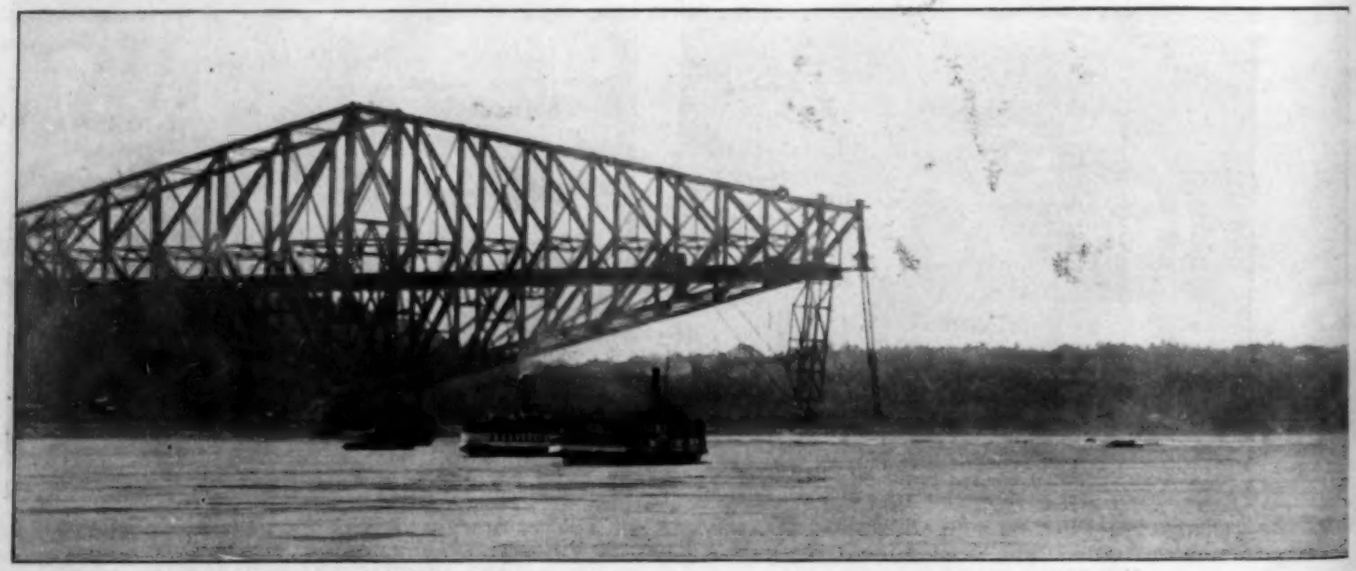
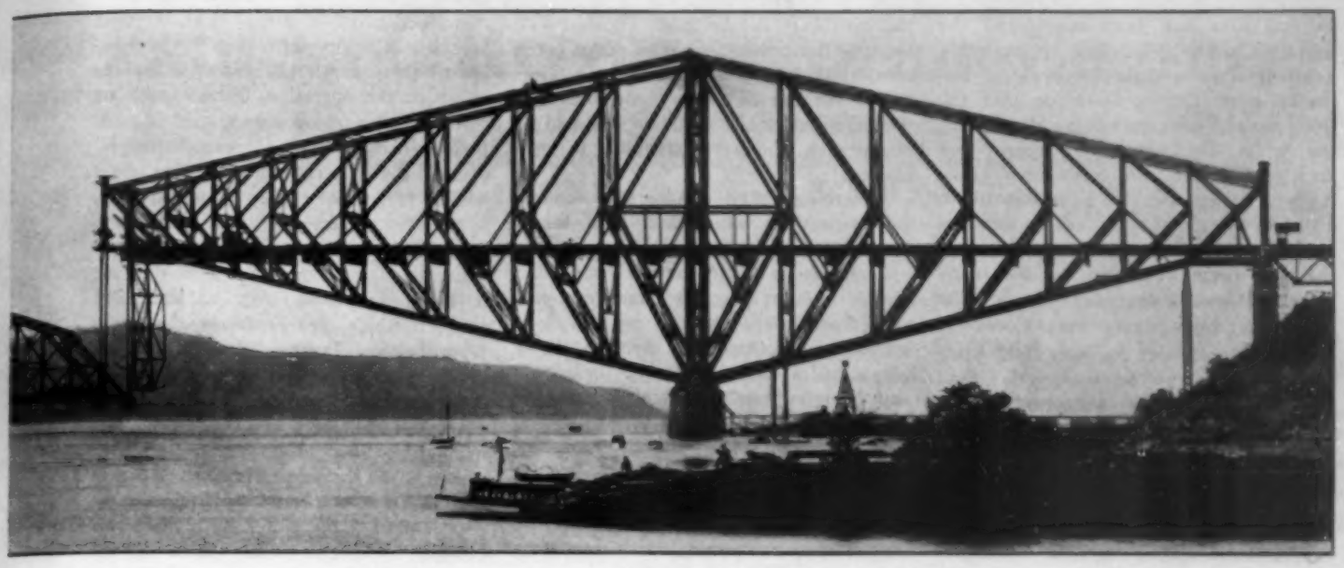


FIG. 5—THE SPAN HAS JUST DISAPPEARED BENEATH THE SURFACE. NOTE THE VIOLENT SWAYING OF

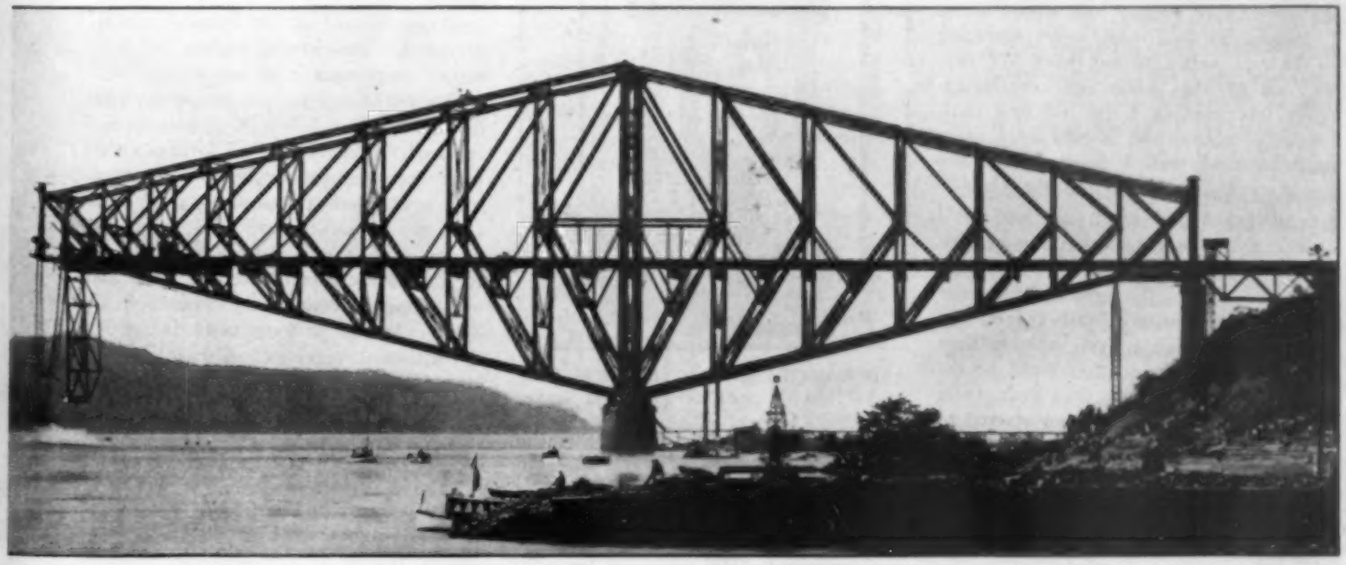


THE BARGES TO THE CANTILEVERS. THIS PICTURE WAS TAKEN A FEW MINUTES BEFORE THE ACCIDENT

span. The tide was commencing to ebb and as it flowed out the barges floated higher and higher, gradually transferring the weight of the span to the cantilevers. This was the test to show if the hoisting equipment and cantilevers would bear the load. No one was permitted on the bridge except workmen and officials of the company and anyone of these who wished to leave was allowed to do so freely. As calculated, the outer end of each cantilever moved 11 inches due to the transfer of weight and the gap between the cantilevers shortened 1 foot. It had been thought that this might be accompanied by noises due to the readjustment of shape, but I was told that those who were at the extreme end, heard absolutely no sounds coming from the structure.

At 9:25 a. m. the span was free of the scows which were quickly towed away revealing the spectacle of the enormous span hanging from the cantilevers with about 15 feet of clearance above the water. The second act had been finished and whistles and cheers showed the crowd's appreciation of the most spectacular part of the operation. A small launch shot under the span, being the first and only boat to pass under the Quebec bridge.

Several lifts were made principally to make sure the hoisting equipment was performing satisfactorily. An hour was then taken for a well-earned breakfast, the engineers and workmen having been up all night. At 10:30 the lifting was resumed and several spectators, including myself, were allowed to go to the outer end of the north cantilever. I had spent all of the previous Saturday morning on the bridge and was fairly familiar with the details of the hoisting arrangements; one was forced to admire their great ingenuity, their obvious power and strength, the precision of the workmanship, and the remarkable precautions taken to avoid accidents. A telephone system was in operation with stations on each cantilever and on the center span 100 feet below. Indicators showed that the jacks were working accurately together and that no jack was higher than the other. As the hydraulic jacks lifted the jacking girders, they were followed up with screw jacks, so that if for any reason the hydraulic jacks failed, the load would be carried by the screw jacks without even the shock due to the span dropping a small distance. Three or four complete rehearsals had previously been made and each man knew precisely the work that he had to do.



THE MOORING TRUSSES, THE HANGER CHAINS, AND THE CABLES HANGING FROM THE CANTILEVERS

Several lifts had been made and the operation was proceeding as smoothly as if it were a daily occurrence. Remarks were facetiously made that the thing was getting monotonous, and off the bridge, the sight-seeing crowd had largely dispersed. A locomotive crane lowered three men in a bucket about 100 feet to untie some cables attached to the hanger chains. So smoothly was the span being lifted that, in idle curiosity, we leaned over the edge of the bridge to watch these men at work.

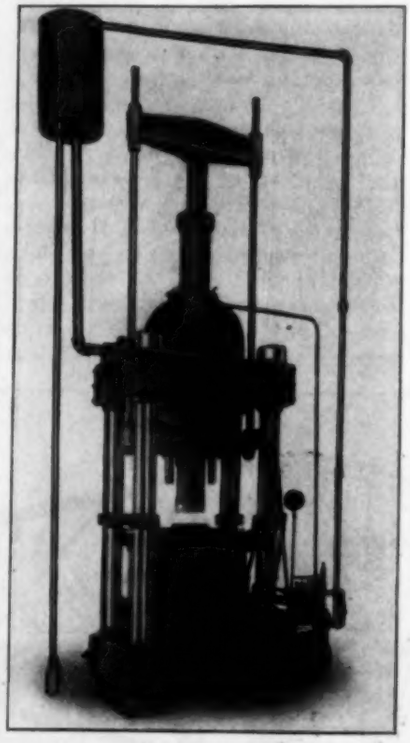
About 10:45, in company with two friends, I started to leave. We had been on a temporary platform four or five steps above the bridge floor. One of my companions had already walked down these steps, I was on the steps, and my other companion was still on the platform. Suddenly something happened indicating serious structural failure. There were noises much like a heavy train rushing through a tunnel. I was thrown violently to the floor, fortunately only sustaining a bruised knee. The men in front of me started running as fast as they could toward the shore and I followed as soon as I could regain my feet. The men upon the platform afterwards told me that they had difficulty in moving at all for several seconds and some of them jumped to a nearby locomotive crane and from there to the bridge floor. Some of the workmen either jumped or were thrown from the cantilevers, falling 150 feet into the river. When I had run perhaps 50 feet the swaying was so violent, that I was convinced the cantilever was falling and I planned to jump in an attempt to clear the steel work if I saw it begin to buckle. After I had gone 300 or 400 feet, the vibrations became reassuringly smaller and I then wondered if I had been unduly alarmed, thinking perhaps that one of the locomotive cranes had tipped over. I stopped to look back when someone in the rear yelled to run hard and that the end of the bridge was crumpling. After this warning I did not stop until I reached shore, and it was only then, upon inquiry, that I learned that the center span had fallen into the river.

Gathering together all available evidence, it is probable that the center span fell and broke in the following sequence: First, the southwest corner fell, elevating the northeast corner, the span being carried entirely at this time by the chains at its southeast and northwest corners; second, the west truss began to buckle and the span started to turn over toward the west; third, the span broke from the chains at its southeast corner and fell back again on the chains at the north east corner; fourth, the span, now buckling badly, fell into the river sidewise and endwise, probably tearing away from the chains at the northeast corner last. Within five seconds the center span had disappeared completely in 250 feet of water. Timbers from the cantilevers and the span floated on the river and boats rushed to rescue men who were struggling to keep afloat.

Something failed despite the wonderful precautions which had been taken. It would be unwise for me to hazard opinions as to the cause of the failure. Many different theories have been advanced and no doubt this point will be settled with convincing certainty by a very careful investigation. A new span will be rebuilt at once, and I have not the slightest doubt that the next and third attempt to span the St. Lawrence river, will be successful.

Builds 1,000-Ton Hydraulic Press

The accompanying illustration shows a powerful hydraulic press of new design, recently brought out by the Hydraulic Press Mfg. Co., Mount Gilead, O. The press is used for briquetting metal borings and turnings, so that they may be remelted without undue loss of valuable ingredients and



1,000-TON HYDRAULIC BRIQUETTING PRESS

to prevent oxidation. It also puts the material in a convenient form for handling. This design of press is of the four-rod, inverted-cylinder type. It is built in three different sizes and pressure capacities, 1,000 tons, 750 tons and 300 tons. The illustration shown is a reproduction of a press of 1,000 tons capacity. The briquette-forming mechanism of these presses is said to be unique in design and operation, being capable of forming a briquette quickly and of uniform density. This is accomplished by placing the material in a floating mold which is supported by four springs. When the pressure is applied upon the material from above, the friction of the material on the sides of the mold cause it to move down over a stationary plunger which projects into the mold from below. Pressure is thus applied on the bottom as well as on the top of the material. It is claimed a briquette of uniform density is obtained in this manner.

After the briquette is formed it is ejected from the mold by the pressure of the main ram applied with the lower plunger removed. This action is accomplished by a simple movement of a controlling lever. The briquette then falls through to the base of the press from whence it is removed. On the 1,000-ton and 750-ton presses, hydraulic push cylinders lift the floating mold while the lower die is withdrawn or returned to place. A collar surrounding the lower die is held against the mold by a spring to close up the clearance between the mold and the lower die in the 300-ton press.

The press in the accompanying illustration is provided with a surge tank, the base of which is located higher than the main cylinder. By a simple movement of the valve lever the plunger drops to the material in the mold and the main cylinder is filled with fluid by suction caused by the lowering of the ram as well as by gravity acting on the fluid. Thus the first stroke of the pump initiates the pressure upon the material. After the pressing operation the main ram is returned by means of the auxiliary ram located at the extreme top of the press. This action returns the fluid to the surge tank.

The stationary plunger projecting into the mold from below is displaced and replaced by means of a lever located near the operating valve. The strain rods are heat-treated forged steel, with solid heads and collars. The main ram is guided in its travel by babbitted bearings working upon the strain rods and by a long bearing in the throat of the cylinder. The floating mold is guided by babbitted bearings. The collars located on the center of the strain rods prevent the floating mold from ascending too high.

During the first half of last year 42,000 tons of pig iron and 38,000 tons of steel ingots were produced in New South Wales, as compared with 75,150 and 24,420 tons in all of 1914.

Value of Records to an Engineer

Records Have Always Been Identified With Efficiency and Cost Reduction—This Article Describes Some Practical Schemes for Keeping Reliable Records—Such Systems Should Be Self Sustaining

BY RAY S. HUEY

WHEN an engineer, after numerous promotions, reaches the degree of success where he becomes the head of a department, he soon is confronted with the problem of costs. There is not a move made nor an article used that does not cost money, and the engineer's value to his superiors is measured by the cost of operating the department under his regime compared to that of his predecessor. Without any previous experience he is unable to put his finger on the high spots and he gropes around in the dark until he gives the matter enough serious thought to formulate some plan to get his costs into some shape that are intelligible to him. If he is of an investigating turn of mind and wishes to know why some things seem to cost more than is necessary, he will soon start some comparative records, probably crude and simple at first. These will be amplified as time and experience require.

Although the final manufactured product may be the same, local conditions make the methods of procedure more or less different, so the engineer must, by necessity, work out his own salvation and adopt methods of his own to suit his own particular needs. It is therefore impossible to make a standard that we can say is suitable for all conditions. Any record that is of any value whatever should be accurate, and to be accurate it should be automatic. By that I mean that it should be kept up at all times as part of the every day routine and should not be a record of an isolated case or one that has to be dug out of a maze of figures, or data of doubtful value, which, when finished, cannot possibly be as accurate as one that is kept up as part of the regular work.

Work Must Be Systematized

Unless this is done as routine work, one of the human cogs in the machine forgets to do his part at some critical time. The results of a test or trial always depend on more than one person, and the record is then incomplete and inaccurate and therefore may be misleading.

When the relative merits of a purchased article are considered, if a record or series of records, on a number of competing articles, are available, it carries infinitely more weight in an argument with the salesman and the purchasing department than an occasional record, because it is clearly to be seen that the chance for error is a great deal less when the record is kept automatically and completely for any and all, regardless of whether it is a special test or not. Special tests, by the way, are, as a rule, quite unreliable and it is generally only after repeated tests that the advantages and disadvantages are fully known.

It is with these thoughts in mind that this paper is presented, to give a few ideas that have been impressed on me, in the hope that it will be of some assistance to those who desire to obtain more definite information regarding the details of their departments.

How Records are Kept

When a company expands and builds new plants, the organization is new and more or less inexperienced and there is no one who knows the cost of this or that detail. At the end of the month, a statement is received from the accounting department, giving the cost of each item on the cost sheet.

Any detailed costs are obtained only by great effort and are unreliable. I do not mean to cast any reflections on accounting departments, but the ordinary facts and figures from which these details are obtained are not sufficient from which to get accurate results. As time goes on and experience increases, a system is devised that gives invaluable and reliable records, and costs no more than the old unreliable methods. In the office may be a clerk, whose duties require him to keep a set of record books that should be up-to-date at all times.

These books are of the loose-leaf variety, composed of sheets on which is ruled and printed in a quantity, or ruled by hand the substance of the record to be kept. Each machine and part, on which a record is kept, should have a separate sheet, and if the number of sheets is large enough, due to the number of machines or to the number of parts replaced, to warrant the expense of a printed sheet, it is a labor-saver, but for those starting a record it is advisable to rule up the sheets by hand the first time, on account of the frequent changes necessary to get the record into a more or less complete and satisfactory state.

Each sheet should be ruled up to suit the needs of the particular machine of which it is to be the record, and all the parts should be included in it, so that the sheet is a complete record of that particular machine.

In our particular case, each foreman in charge of a number of men in the mechanical, electrical or operating department makes out a mill report, some on printed daily report-sheets which are sent to the office for cost and output purposes, such as the operating department, and some on a plain sheet of paper where a printed form will not do, such as the mechanical, and electrical departments. The operating department in the "remarks column" makes note of any machine down for repairs and states in general what is being done. On the mechanical or electrical foreman's report, a detailed statement is made showing the pattern number of the parts changed, or any other identifying remarks if it has no pattern number, and the reason for the change, such as broken, worn out, etc.

When the article is purchased from the storeroom, special details are explained on tags and this is embodied in the report.

On any very particular or expensive replacement, it is customary to have a copy of the store ticket forwarded to the superintendent's office. This is done to call the matter to the superintendent's attention, as he may wish to make some personal observations of the article.

Reports Help Superintendent

After the superintendent has made his ususal daily inspection of the reports, they are forwarded to the clerk who enters in his books, each item, against its respective mill, giving date installed, the reason for its installation, material and any other illuminating remarks in the report.

When a new part is entered as having been installed, it is obvious that the old part is removed and either that it has served the limit of its usefulness or has to be rejuvenated and put back; all of which can be taken care of in the record. If there are a number of the same articles in one machine, the parts are numbered and the record kept of the

A paper presented at the Chicago convention of the Association of Iron and Steel Electrical Engineers, Sept. 18-22, 1916.

numbers and it then makes no difference if the parts are taken out and put in another machine of the same kind, as the record follows the number.

If it is removed on account of its inability to be of further service, the clerk from the mill-practice records gets the actual life in hours, days, weeks or months or it can be worked out to give results in tons made, or barrels conveyed, or any other desirable unit.

If it is desirable to go further, a column can be provided for the unit cost of operation which will work out as cost per hour, day, barrel, ton, etc., which is the figure desired. This can be misleading if the proper unit is not selected, as an illustration will show: A belt conveyor was installed and a number of belts used. The record had been kept to show the cost per hour of operation. It was observed that the more recent belts were not showing as good cost per hour and, after going over the record carefully and comparing the quantity of material conveyed which after all was what was desired, it was found that on account of the increased capacity of the plant at the later date, the later belts had conveyed much more material than the first ones and therefore the cost per barrel was less while the cost per hour was more.

Valuable in Judging Equipment

After a record has been kept for some time and a study made in some particular, there will be facts standing out so boldly that the wonder is they were not seen before. A different quality, a different kind of material or any other variation out of the ordinary is instantly comparable with years of past experience and it has been the means of reducing the cost of some repairs, not only 10, 20 or 30 per cent, but in some cases 500 per cent. These, however, are rare cases.

Most records not kept in a regular way are kept in someone's memory, and after a set of records has been kept it is very interesting to see how exceedingly unreliable, untrustworthy and misleading the memory can be.

Furthermore, when the record is left to the memory, a salesman may have good reason to believe that his goods are not getting fair and impartial treatment and, in some cases, it may lead to even more sinister thoughts, but when confronted by actual records, he should have no doubt in his mind that he is being fairly and generously treated. On account of the records, the salesman goes back with a report from which his firm can work to improve the quality of the article in question—quite frequently with success. The improved article then helps the operating engineer to get better results which, in turn, decrease costs.

I also believe that more courtesy and respect is shown by salesmen or engineers when they are confronted by actual records, as they will not take up a busy man's time in trying to sell an article if they can see for themselves that the article is unsatisfactory. On the other hand, if evidence is not at hand, the salesman may confidently believe that the article will be suitable and economical, and he may be right if you cannot argue with any facts to back you up.

A few instances will show how valuable these records may become. A certain mill required 20 heavy, expensive, steel plates which, although made from the same heat, seemed to give very widely different results. It was only by means of the records in connection with experiments relating to the mixture, analysis and heat treatment that the service of these plates was increased. Some of these plates lasted a year or more and while they were 3 inches thick at the start, wore to a thickness of less than ⅛ inch before they broke. Others would break and split from end to end in one day and it was necessary to dismantle a machine and install a new plate, which was a long and expensive delay. Analyses were made and the good and bad plates might have the same analyses and no results were obtained from them. A microscope was purchased and the steel of a good plate was examined physically along with the chemical analysis. Then the bad ones were examined the same way and photographs were made. Different heat treatments were then tried, as the physical analyses seemed to show that the steel had not been properly heat-treated.

By comparing the records with the data obtained from these analyses, both physical and chemical, it was noted that progress was being made in the plant. By the continuation of this investigation, the plates were finally manufactured so that they all gave uniformly good results. The extra service obtained from these plates alone would pay for the cost of keeping the records in the whole plant.

Applicable to Electrical Equipment

Another illustration, showing the advantage of a record in a minor detail, is one on incandescent lamps. It showed at first that the life of the lamps was very low. Upon investigation, it was found that the voltage of the system fluctuated greatly, so a Tirrill regulator was installed. The record was then kept of all lamps, 250 watt and above. When a lamp was installed, the date was scratched in the skirt of the base and when it came out, this date was also scratched on it. A tag was then attached to the lamp giving location used, date in and out, life in hours and the reason for its failure if known, such as broken filament, poor vacuum, glass spalled off at leading-in wire, etc., with any remarks when something out of the ordinary occurred. This lamp was taken by the foreman to his office where he has a book in which he or a clerk enters this information. The lamp with its tag then returns to the storeroom where it is kept safely until inspected, if desired, by the manufacturer's representative if the life has not been up to its guarantee. When the manufacturer's representative, who adjusts these matters, comes to the mill, and is shown the records together with the lamps and actual results on which to base his reports, the claim is always satisfactorily adjusted with the feeling on both sides that there is no guesswork about it.

Records Correct Troubles

Another valuable minor record was one kept on fuses. In this mill were approximately 600 alternating current, 25-cycle motors. These motors were fairly well loaded, but due to variations in voltage and frequency a very large number of fuses were blown daily. It would have been difficult to have kept in stock enough fuses to last until new ones were purchased, and it was necessary to refill the old ones as needed. The fuses were finally turned over to the storeroom, which placed orders on the shop for refilling and a record of the cost of refilling was made.

All labor and material were charged up and a comparison made of the cost of refilled fuses against new fuses, and also against the refillable fuses. Records on motors, showing the location where used and causes of failure, will go a long way toward correcting the trouble when the causes are apparent.

During the recent depression, a reduction in the number of men in the shop was imperative so the shop crew was divided into two groups. One group worked two weeks and then the other group worked two weeks.

By the aid of the shop records, it soon became apparent that certain men were able to accomplish twice as much as the men that worked on

the same work the previous week. It was therefore possible to get more out of the slower ones by the competition and to weed out the drones.

Another record of great value is the pattern record. In the ordinary mill, repairs are made at the plant on practically all the mechanical and electrical machinery. The patterns of the parts are made and castings kept in stock either rough or machined. It is one of the most difficult tasks in the plant to get the right casting every time it is needed, and it is frequently the case that the record of the casting cannot be located at all by the man needing it, or the storekeeper. It may be in stock but the man asking for it may not know the name or pattern number and the storekeeper, not being a mind-reader, is unable to satisfy his customer. Pattern records were kept in consecutive order but in this shape they were useless. A number of records were tried with indifferent success but it finally led to a pattern record that seemed to fill the bill for both the mill and storekeeper. A tracing was made on a sheet about 8 inches by 10 inches and a sheet made for each mill, machine or motor. On this sheet was recorded every part used on the machine. If the part had a pattern number, it was given with the name or description of the part, material from which it was made, drawing number on which it was shown, the building, the machine it was in, number used per unit and any other remarks. If it was a forging or a coil or some other part, it was listed also under the machine of which it was a part, so when the sheet was complete it was a complete record of the parts of the machine.

These sheets were blue printed and bound into a booklet with brass split pins with a tough paper cover. These booklets were then distributed among the foremen and to the storekeeper. When the men came to the foreman for a repair, all the foreman needed to do was to refer to his reference book and knowing what machine it belonged to, it was easy to identify the particular part and send an intelligent order to the storekeeper. It took less time to find out what was wanted and less time for the storekeeper to fill the order and has been very satisfactory.

There is a danger of carrying this matter of records too far. When their value is realized and a system is started the engineer may feel that he wants records of everything and then to go to excess in the matter, so that the expense of keeping them up is not justified by the advantages derived.

Therefore, one of the important questions to be decided is what records are of enough value so that the information derived therefrom will warrant the necessary expense of keeping them and, that having been decided, the next thing is just how to keep the records to give the desired information. This last question will eventually take care of itself, as only by a trial and subsequent alteration will a record be found to be complete enough for satisfactory use.

Sparks from the Grinding Wheel

By H. O. Tair

AND now fame comes at last—the iron foundry has broken into the movies, or the movies into the iron foundry. The heroine of "The Iron Woman" being filmed in New York, goes into eastern foundries, lifts heavy castings, places patterns in the sand, pours metal, etc., for all of which she receives the paltry sum of $5,000 a week.

* * *

A writer in *Engineering and Contracting*, brings figures to show that with Niagara Falls "going to waste" and not being entirely utilized, it is costing Americans and Canadians $150 a look at this mightiest of spectacles. Send out an SOS call for the German scientist who can make use of the 3,000,000 horsepower of energy flowing away and yet retain the majesty and grandeur of Niagara Falls for honeymooners and others more sane.

* * *

Six hundred more coal miners (Industrial Workers of the World) in Pittston and vicinity have voted to return to work, each adopting a new slogan, we suppose—"I will work".

* * *

That largest, most powerful searchlight ever manufactured, which, it is believed, is being made for the United States government by the General Electric Co. would come in handy in the hide and seek game in Mexico. Its white rays can be seen 200 miles.

* * *

If the printer doesn't run out of letters, this column would like to report that ferro-molybdenum, tungsten-molybdenum, sheelite, manganese, selenium, wolframite, bauxite, hematite, ferro-chrome, molybdenite, vanadium and ferro-vanadium have been placed on the contraband list by Italy.

* * *

Headline in our favorite weekly, *The Iron Trade Review*, "Prosperity Reigns, Paralysis Feared." If this reaches the "war babies," will it be a continuation of the infantile paralysis epidemic?

* * *

Now we know why the metal industry thrives in Germany in the face of so many vicissitudes; 430,000 iron crosses have been distributed. It seems to us that real courage would be exhibited by refusing one.

* * *

Ben Tillman's advice to the conference committee on the naval bill was "Sit tight, keep on grinding and say nothing". Tell us Ben, what axes has that committee which require attention?

* * *

Head-line from an esteemed contemporary, "Steel Bands Rise". Must have been playing the Star Spangled Banner.

* * *

Said Miss Sheet Plate to the Bar Iron as she kissed him on the lip,
"You did not make me blush—I saw the cold rolled strip."

* * *

From Mexico there came a deserter,
To blow a bessemer converter.
Said he, in his ire,
"From the pan to the fire,
I've jumped. In the south I really felt perter."

* * *

The Chinese see the money taken out of antimony, as we learn from a recent issue of *The Daily Iron Trade and Metal Market Report* that antimony prices have collapsed and scores of Chinamen who were millionaires on paper a few months ago are now computing their liabilities.

* * *

Having produced flawless, wreckless rails, let the New York Central go ahead and bring out a porterless, tipless sleeper.

* * *

An item from the *Danielson* (Conn.) *News*, showing how popular the blast furnace is becoming these days: "The Congregational Church of Dayville held its annual picnic Saturday at The Old Furnace."

* * *

"Doctor—the needle quick!"

"As a result of thermal and microscopical analysis the metals tungsten and molybdenum are reported to be completely isomorphous."

From the summary of the results of an investigation of tungsten and molybdenum alloys by Dr. Frank A. Fahrenwald, of our own Cleveland, Ohio.

* * *

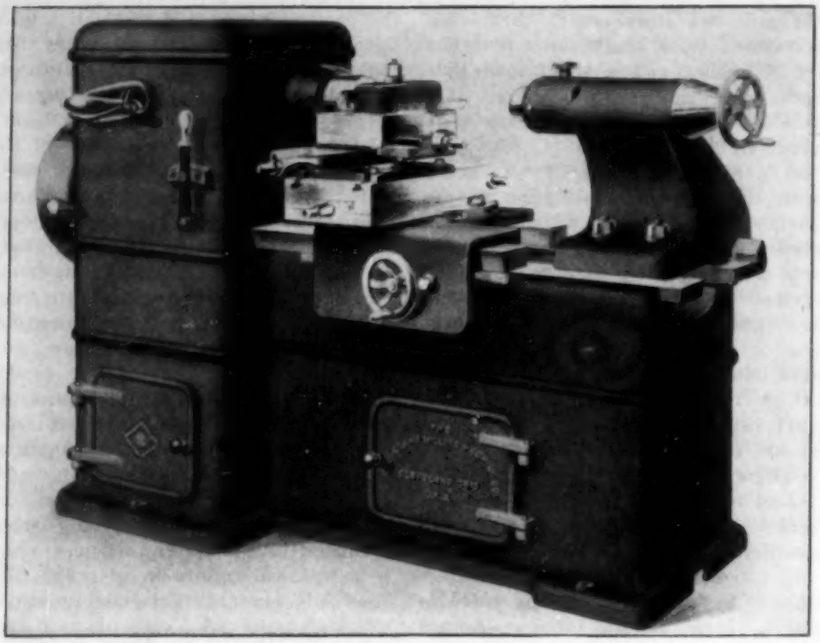
In our esteemed contemporary, *The Iron Trade Review*, we read the following headline: "Many Cans Needed" and reading further we learn that this need arose with the departure of the troops to the border.

We confirm that statement.

A can should be tied to each and every Mexican marauder.

* * *

Should anything have happened to the food supply on that German submarine that ran the British blockade, the crew could have gone on a dye-it.



A NEW RELIEVING MACHINE

Builds Novel Relieving Machine

The Cleveland Milling Machine Co., Cleveland, recently brought out a machine tool of unusual design which is believed to be the first machine of its type to be built. This tool, known as the Cleveland relieving machine, is built with box sections throughout and will take work up to 20 inches between centers. The work spindle is worm driven, power being delivered to the worm and cam by spiral gears. The spindle is equipped with bronze boxes and all adjustments are taken up with one nut.

The machine is built with single pulley drive, with quick change gears for the spindle speeds, of which there are five. The cam throw on this tool is adjustable and may be set from zero to ¼-inch clearance on the tooth of the cutter to be cleared. This clearance may be adjusted by means of a conveniently located screw.

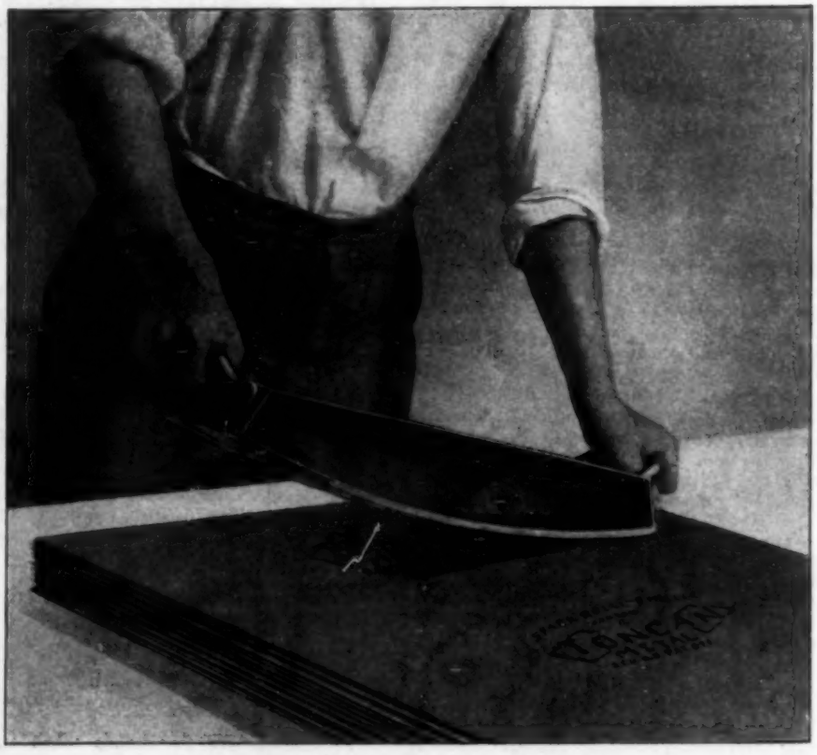
The carriage of this machine is so constructed that it will swivel to any angle to the spindle and give straight, side or end relief. Taper gibs are used throughout for adjusting the slides. The tool holder block is also adjustable, allowing the tool to be brought to the proper height after grinding. This device also permits the use of tools of varying thickness.

One of the unusual features of this machine is the arrangement whereby the position of the tooth of the cutter can be brought to any relative position of the forming tool. This is accomplished through an adjusting lever without the manipulation of any bolts or nuts. This arrangement greatly simplifies the details of operation and effects a saving in time.

Brands Sheets Three Times

The Stark Rolling Mill Co., Canton, O., has adopted a policy of marking all of its galvanized sheet products in three places on each sheet instead of only twice, as heretofore. The stamp containing the words "Toncan Metal Sheets" is placed on both ends of the sheet and also in the middle. This method of branding makes it certain that even the smallest consumer, who may buy only part of a sheet, will know exactly what he is getting. The Stark Rolling Mill Co. found in the past that parts of sheets returned as defective were not of its manufacture. By branding each sheet in three places the customer is protected from any difficulties of this sort. The brands are stamped with a large rubber stamp about 18 inches wide and 26 inches long, furnished by Jas. H. Matthews & Co., Pittsburgh. The stamp is curved in order to facilitate its manipulation by an inexperienced workman. The ink is furnished by a self-inking stamp pad of large dimensions. A red ink is used which is said to be impervious to water and to resist removal except by the application of acids or abrasives.

With the object of placing in convenient and accessible form before those in the United States interested in or responsible for railway materials, the bureau of standards, department of commerce, in connection with its investigation of failures of railway material, has obtained, through the courtesy of the state department, copies of specifications for railway material in several European countries. These specifications are given in full, together with a digest and discussion in Technologic Paper No. 61, just issued.



MARKING SHEETS WITH RUBBER STAMP

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Foundry Fires

What part of a foundry presents the greatest fire risk?

Of 475 foundry fires reported to the National Fire Protection Association since October, 1906, 112 were directly or indirectly caused by cupolas. Sparks from cupolas were responsible for 87 of these fires, and radiated heat caused 14. The remaining 11 fires charged to cupolas were the result of miscellaneous causes indirectly connected with the melting apparatus. The fire record of foundries as compiled by the association is as follows:

Cause.	No. of fires.
Cupola	112
Core oven	40
Molding, pouring, and casting	34
Furnaces	25
Hot castings	8
Fuel oil	8
Flasks	7
Asphaltum or tar dipping of pipes	5
Phosphorus	3
Dip tank	2
Charcoal	2
Slag	1
Common causes	101
Incendiary	8
Exposure	8
Unknown	111
Total	475

Pig Iron Quotations

Why is it that southern iron is usually quoted higher in Birmingham than in Cincinnati, in view of the fact that Cincinnati is supposed to be one of the principal selling points for southern iron?

The principal reason is that southern iron in Cincinnati meets with keen competition from southern Ohio stacks and also occasionally from makes from lake furnaces. If the iron comes from Alabama, it also meets competition from Tennessee and vice versa. The result is that the price of iron sold in Cincinnati must be equalized by the marketing of three or four makes from various parts of the country. If a melter in Birmingham, Ala., or some other southern point is in the market for southern iron, he has no alternative, except to buy from southern stacks, which in a case of this kind, compete only among themselves. As a result, southern iron is usually held at a higher level in Alabama than in Cincinnati.

Past and Present Iron Prices

How do prevailing pig iron prices compare with those obtained in 1907? I am especially interested in steel making grades of pig iron, including both bessemer and basic iron.

Prices of all grades of pig iron today are low compared with those existing in 1907, although the general condition of the market now is much more healthful than it was nine years ago. Tables maintained by *The Iron Trade Review* indicate that bessemer iron the first eight months of this year sold at a range from $20.21 to $21 a ton at valley furnaces; the market has been at $21 up to within the last few weeks. Basic iron during the same period has been established at averages ranging from $17.83 to $18.25, although the market since April 1 has been hovering around $18, valley. In 1907, bessemer pig iron was established at $22.07, valley, the initial month of the year. In May of that year, the average selling price was $23.25, valley. During the last four months of the year this grade gradually declined, dropping to an average price of $18.88 in December. The average monthly price of bessemer iron in 1907 was $21.74, valley, according to figures based upon actual sales. Basic pig iron in January, 1907, was established at an average of $22; in May of that year this grade was sold at an average of $23 a ton. In December of 1907, the average sales price of basic iron was $18. The average monthly price of basic pig iron in that year was $20.93.

Differential in Pig Iron Prices

Is there any fixed differential between prices of standard bessemer and foundry pig iron, or between standard bessemer and low phosphorus pig iron?

There is no fixed spread in prices between either bessemer and foundry irons or bessemer and low phosphorus irons. An examination of the prices of these respective grades at Pittsburgh covering the past several years shows that usually there has been a spread of from $1.00 to $1.50 between bessemer and No. 2 foundry. At the present time, this difference is considerably greater in favor of bessemer iron, due probably to the recent active demand for export for the former grade and to the strong market generally for steelmaking irons as contrasted with the rather sluggish condition of foundry metal. In the past, producers of standard low phosphorus iron in some districts have sought to maintain prices for their product at about $5.00 a ton over bessemer iron. At the present time, however, the spread is much larger, amounting to approximately $11 to $12. This seems to have been occasioned by the especially strong demand for low phosphorus iron, both domestic and export, for munition production and steel foundry operations, which, by reason of the limited production due to the scarcity of low phosphorus ores, has caused this iron to advance rapidly to a high point.

Sulphur in Furnace Gas

How is sulphur removed from blast furnace gas? Can gas containing small amounts of sulphur be used successfully in an internal combustion engine?

Sulphur is generally removed from blast furnace gas by a chemical process which consists of passing the gas through a sponge of iron oxide. The

efficiency of this method is said to be about 80 per cent, but will average less than this figure unless the iron oxide sponge is renewed frequently. If the sulphur content of the gas does not exceed two grains per cubic foot, it is generally conceded it may be used successfully in engines provided water can be kept from the cylinder and exhaust so that acid is not formed. It also is necessary when using such gas that the piston rods be kept hot enough to prevent condensation. Unusually good lubrication of the rods is essential.

Brings Out New Designs

THE Valley City Machine Works, Grand Rapids, Mich., recently announced a new design of semi-universal milling attachment. This device embodies a number of unusual features and is said to be a great improvement over the conventional type of miller in that the operator is enabled,

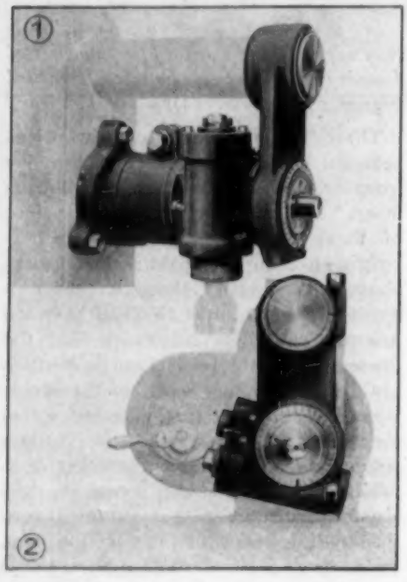


FIG. 1—SEMI-UNIVERSAL MILLING ATTACHMENT IN A VERTICAL POSITION. FIG. 2—MILLING ATTACHMENT IN AN ANGULAR POSITION.

through its use, to get closer to angular cuts and still have a rigid support. The attachment swings clear under the overarm and may be reversed if desired. The hole through the spindle is said to be particularly accessible when the spindle is in a vertical position. Moving the spindle into this position is accomplished by offsetting the spindle of the attachment from the milling machine spindle proper.

The drive of this tool is through a splined arbor, coarse-pitched miter gears, intermediate ball-bearing shaft and a pair of heavy steel spur gears. The spindle is designed to rotate in the same direction as the milling machine spindle and is fitted with a No. 10 taper.

The attachment is built with a clamp base which is bored to fit the spindle box and is secured by screws to the column. The device may also be applied to other types of milling machines after slight modifications have been made. The accompanying illustrations show the device in a vertical and in an angular position.

The unusual demand for motor-driven grinding and buffing machines in which any type motor of the proper power may be used without regard for speed or kind of current, has prompted the Valley City Machine Works to bring out an enclosed motor base type of machine shown in Fig. 3. This tool is built in two sizes and the accompanying illustration shows the larger ,which is capable of carrying grinder heads up to and including 18 inches. The base of this machine is large enough to accommodate a 5-horsepower motor which is placed on a pivoted base at right angles to the grinder spindle, which it drives with a quarter twist belt. The tension of this belt may be varied by means of the adjustment screw which is shown at the base of the machine.

It is said that machines of this type possess distinct advantages in that the treatment accorded tools of this nature is not conducive to long life. It is claimed that with the use of a belt for driving the spindle, sudden shocks are cushioned or absorbed without damaging the motor. The enclosed motor is a feature which tends to keep the motor free from grit and dirt.

Modern Methods of Mining Coal

Improved operating methods for the efficient mining of bituminous coal in the Connellsville regions of western Pennsylvania were described, Sept. 26, by Patrick Mullen, mine inspector of the H. C. Frick Coke Co., before the metallurgical and mining section of the Engineers' Society of western Pennsylvania. Under the supervision of Mr. Mullen, the Frick company sometime ago installed shortwall mining machines for the extraction of rib coal, in an effort to increase the output of coal per man per day and to reduce the possibilities of accidents. Coal mine operators in the bituminous district for several years have been concentrating mine operations in order to supervise the work more closely. Electrically driven mining equipment has been installed at many of the mines to increase the output of coal. The Frick company was the first to apply machine mining to rib extraction and Mr. Mullen stated that the new method has proved to be exceedingly satisfactory. He said in part:

"The use of electrically driven mining machines and the blasting of coal on the very rib line itself requires a system of ventilation that will insure gob gas being found only on the return. Such a system of ventilation necessitates ample, reliable fan equipment, airways of sufficient size and number, a generous provision of upcast openings, wise coursing of the air current and the existence of numerous bleeders from every gob

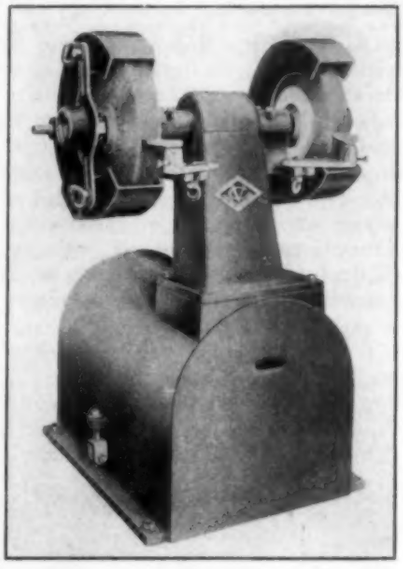


FIG. 3 — MOTOR-DRIVEN, ENCLOSED-BASE GRINDING OR BUFFING MACHINE

into a return airway. It also demands the elimination of danger from dust by keeping it sprinkled and removing it before any dangerous accumulations are found, and in addition demands the use of permissible explosives and then only in the hands of selected competent shot firers.

"On account of the intense concentration of working places and the output which is obtained, it is necessary that the haulage arrangements and the haulage equipment be perfected beyond anything which had previously been necessary and the transportation of coal cannot well be handled except by the use of electric gathering locomotives.

"The general plan by simple modifications can be made to suit all conditions; depth of cover; presence or absence of drawslate; nature of coal; nature of bottom and roof, and is divided into what we know as maximum, medium

and minimum plans.

"The maximum plan is applicable where the overlying cover does not exceed 125 feet and where the coal is hard roof and bottom good.

"The medium plan is applied where this cover does not exceed 250 feet with the same physical condition of coal and bottom and roof, as obtains under the maximum plan.

"The minimum plan may be applied to coal underlying any depth or thickness of cover and whether or not the coal is hard or soft and the physical condition of roof and bottom good or bad, provided, of course, that mining machines in any form can be used.

"The H. C. Frick Coke Co. has always worked its mines according to a projection, carefully prepared, for the field of coal to be worked before actual excavations have been started. In this plan of concentrated mining it has been found of great advantage to supplement these general projections with a schedule, prepared on a 20-foot to the inch scale, showing in detail, the daily operations."

Develops New Rail Drilling Machine

THE accompanying illustration shows a newly developed five spindle horizontal rail drilling machine, recently designed and built by the Newton Machine Tool Works, Inc., Philadelphia.

The spindles are arranged so that two operate from one side of the rail, and three from the other side. This design permits the drilling of closely spaced holes and makes possible the employment of a powerful drive. The range of adjustment on the three-spindle head is from 4 inches to 10½ inches between centers, the central spindle being fixed, while the two outside spindles may be adjusted from the operating side by means of a screw. On the two-spindle head, the adjustment of spindles ranges from 4 to 19 inches between centers. Either spindle on the two-spindle head can be brought within 1 inch of the center line of the central or fixed spindle on the three-spindle head, thus providing a possibility of drilling holes within 1 inch center distance.

The maximum distance between the ends of spindles is 26 inches and the length of feed motion to each spindle is 12 inches, which will permit of removing a full length drill without disturbing the setting of the rail. Spindle gears are all of heat-treated alloy steel.

The spindle saddles have full bearing on the base with scrap and taper shoes to compensate for wear, and are operated from a common pair of feed screws with right and left hand threads so that the right and left hand heads operate simultaneously.

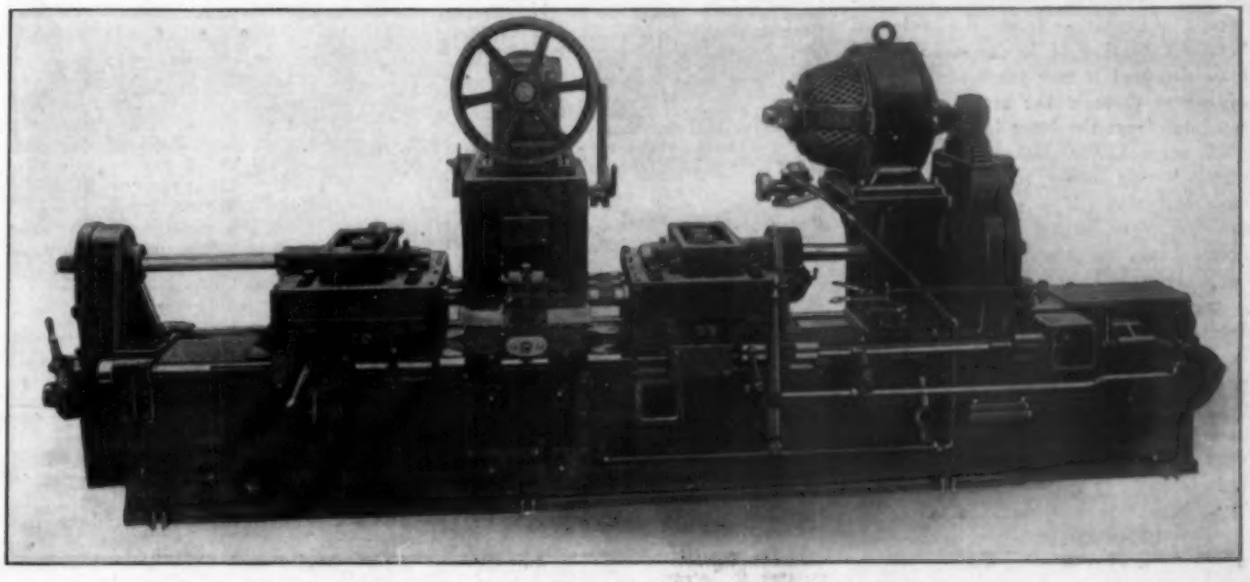
The spindle heads have four changes of feed with rapid power traverse in both directions. The saddles are supplied with an adjustable automatic stop to the feed motion and with a rapid power return having a safety limit to prevent jamming at either end of the movement.

The machine has an adjustable elevating table to take care of the different size rails and is provided with an air controled clamp. The machine is driven by a 15-horsepower motor having a speed range of from 400 to 1,200 revolutions per minute.

W. H. Christy, formerly superintendent of the Bessemer Foundry Co., Grove City, Pa., and H. S. Chambers, of the Burrows Foundry Co., Ellwood City, Pa., have purchased the Burrows plant, which will be operated under the name of the Lawrence Foundry Co. Equipment is being installed to increase capacity from 10 tons to 35 tons a day of gray iron castings.

Purchases Plant

The Edgewater Steel Co., Pittsburgh, the incorporation of which recently was noted in these columns, has completed the details of organization and has purchased the plant of the Kennedy-Stroh Corporation at Oakmont, Pa. Open hearth steel capacity will be provided at an early date and equipment will be installed for the manufacture of a diversified line of steel and brass products, including locomotive and car wheel tires, rolled steel wheels, gear rims, roll shells and turbine rings. Directors of the company are: Charles T. Schoen, E. W. Mudge, Maurice Falk, William L. Jacoby, E. T. Weir, Leon Falk, W. H. Schoen, M. R. Jackson, C. M. Thorp, J. H. Baily and F. B. Bell. The officers are: President, F. B. Bell; vice president, M. R. Jackson; treasurer, W. H. Schoen; secretary, J. H. Baily, and general manager, F. C. Riddile.



FIVE SPINDLE HORIZONTAL RAIL DRILLING MACHINE

Iron and Money: Fact and Comment

Steel Shares Advance Sharply in Most Spectacular Bull Market Wall Street Has Seen in Many Years

UNDOUBTEDLY the most noteworthy feature of the financial situation at the moment is the speculative mania manifested in the runaway market in stocks. Wall street has been experiencing a bull market such as it has seldom seen, with a turnover of shares surpassed only in those other phenomenal markets of 1901 and 1907. Public interest in the stock market at present is probably broader than ever before. Business men from Maine to California are having their fling at the market and have the funds to back their "fliers" as a result of the prosperous conditions in nearly all lines of trade. On 21 consecutive business days in September, sales on the New York stock exchange exceeded 1,000,000 shares; in a single day, sales exceeded 2,000,000 shares. This stirring activity was accompanied by a rise in prices to the highest average quotation for industrial stocks that has ever been attained and the highest average for railroad shares since the outbreak of the war.

Most Wall Street brokers will mention inflation as the fundamental cause for the present market. Money is plentiful and is circulating with extraordinary freedom. Labor has never made such wages as at present and is spending quite as freely, thus increasing the domestic demand for necessities and luxuries. Fortunes have been rolled up almost over night by manufacturers of automobiles and munitions and by the producers of raw materials used in munitions. Industrial companies have reversed themselves from the role of borrower to that of lender—who would have dreamed it two years ago? Then of course there is the credit expansion resulting from the huge importations of gold, some $300,000,000 of the precious metal having come into this country since last May. This gold, if deposited in New York banks, would be a sufficient basis for about $1,750,000,000 in bank credits. Thus a plethora of funds is created in this country, so large that Wall Street may enjoy intense activity, the crops may be financed, commerce run at the maximum with commodity prices the highest ever quoted, millions upon millions be loaned to foreign nations and still the money market is easy. It is so easy, in fact, that, as one prominent banker puts it, banking is one of the few important branches of business which is not prospering under present conditions.

Considerable interest naturally centers in the operations of the world's greatest industrial organization, the United States Steel Corporation. This interest has extended to all the minor steel shares. Among these Republic Iron & Steel common was the most conspicuous the past week, with its net advance of over 12 points. The Steel Corporation's earnings for the quarter ended Sept. 30 will, without doubt, eclipse any previous three months' period in the Corporation's history; the same statement probably applies to all the independent steel producers. As earnings are by no means represented in dividends paid, Wall street is busily trying to write into the valuation of each stock the growing accrual to its surplus. This is the generally accepted reason for the present market in the steel shares.

Quotations on a number of leading iron and steel and industrial stocks at the close of the New York stock exchange Sept. 30 and net changes for the preceding week are shown in the following table:

	Close Sept. 30.	Net chg.
American Can	65¼	+ ¼
American Can, prfd.	115	+1½
Amer. Car & Fdy.	71	+3¼
Amer. Car & Fdy., prfd.	118	+ ⅞
American Locomotive	79¾	+ ⅜
American Locomotive, prfd.	106½	.....
American Steel Foundries	61½	+3½
Baldwin Locomotive	87½	+ ½
Baldwin Locomotive, prfd.	106½	+ ½
Bethlehem Steel	569½	+11
Bethlehem Steel, prfd.	134⅞	—1½
Colorado Fuel & Iron	60¾	+5½
Continental Can	103	—2½
Crucible Steel	93½	+ ⅞
Crucible Steel, prfd.	122	+1¼
General Electric	182	+8
Gulf States Steel	94	+ ¾
Gulf States Steel, 1st prfd.	101	+1
Gulf States Steel, 2d prfd.	96	+2
Internat'l Harv. of N. J.	117	+ ¼
Inter. Harv. of N. J., prfd.	117¼	—2¾
International Harv. Corp.	80	+2
Internat'l Harv. Corp., prfd.	109	.....
Lackawanna Steel	88	+3
Nat'l Enamel'g & Stmp. Co.	30	+ ⅜
Nat'l En. & Stmp. Co., prf.	96	+ ½
Pressed Steel Car	69¼	+9¼
Pressed Steel Car, prfd.	104½	+ ⅞
Pullman Palace Car	177	+11
Republic Iron & Steel	80½	+12⅜
Republic Iron & Steel, prfd.	112⅛	+1⅛
U. S. C. I. P. & Fdy. Co.	25½	+2½
U. S. C. I. P. & F. Co., pr.	56¼	+1¼
United States Steel	117⅜	+ ⅜
United States Steel, prfd.	121¼	.....
Westinghouse Mfg. Co.	64½	+ ½

Financial Crop Ends

Directors of the Westinghouse Electric & Mfg. Co., Pittsburgh, have adopted a resolution calling for payment on Jan. 1 of all outstanding 5 per cent convertible bonds and the issues of 1915 at 105 and interest. These bonds are convertible to the end of this year, par for par, into common stock. To date, all but approximately $2,500,000 have been exchanged into stock. The balance not converted on or before Dec. 31 will be redeemed. The Westinghouse Electric & Mfg. Co. has declared the regular quarterly dividends of 1¾ per cent on the preferred and 1½ per cent on the common stocks. The preferred dividend is payable Oct. 16 and the common dividend payable Oct. 31, both to stockholders of record Oct. 6.

* * *

The plan for reorganizing the Salisbury Steel & Iron Co., Utica, N. Y., has been abandoned according to an announcement made by the bondholders' committee of which T. J. Grayson, of New York, is chairman. Less than one-third of the company security holders subscribed to the plan.

* * *

The Worthington Pump & Machinery Corporation is reported to have booked orders aggregating $16,089,551 in the 11 months and seven days ending Sept. 7, an increase of $6,708.149 over the same period the preceding year. Unfilled orders Sept. 7 are stated at $7,025,898, compared with $3,119,415 on the same date last year. War orders are not included in these figures.

* * *

The Atlantic Steel Co., Atlanta, Ga., has purchased $100,000 of its $1,000,000 first mortgage 6 per cent bonds. These bonds were issued last year and do not mature until 1914. The sinking fund does not become operative until 1918, but unexpectedly large earnings have made it feasible to withdraw a tenth of the issue at this time. Liquid assets practically offset the $900,000 bonds outstanding.

* * *

For the second time this year, the E. W. Bliss Co., Brooklyn, N. Y., has declared an extra cash dividend of 100 per cent or $50 a share. Including the present dividend the company has paid 226¼ per cent in dividends so far this year, or $113.12 a share, on the common stock. In 1915, dividends on the same issue amounted to 20 per cent, while earnings on the stock were 434.56 per cent or $217.28 a share.

* * *

The new tractor plant of the Moline Plow Co., Moline, Ill., is practically complete and some departments are already in operation. The remainder is expected to begin work about Oct. 10. The output will be tractors designed for all sorts of farm work, from plowing to harvesting, which will furnish power plants for other uses as well. It is planned to turn out about 20,000 machines a year. The works will cost almost $750,000 and is financed out of surplus, no new capital being involved.

MEN OF MACHINERY TRADE

Who they are Where they are What they are doing

FOLLOWING the resignation of H. A. Cleveland Flagg, sales manager of the Standard Welding Co., and Chas. E. Miller, from the management of the Detroit office of the same company, J. C. Manternach, general manager of the company, has made public the following appointments and promotions, all effective Oct. 1:

P. W. Gilbert, who has been assistant sales manager for nearly five years, takes up the duties of manager of sales. B. A. Quayle, who has had charge of the Chicago office for many years, and who is one of the first salesmen employed by the welding company, becomes general representative, with headquarters at the factory. Benton G. L. Dodge, who has had charge of advertising and publicity for more than five years, takes up the larger duties of manager of sales promotion.

Walter C. Voss, formerly in charge of the Cleveland district, moves to Detroit, where he will assume charge jointly with Ted Palmer, long connected with the Michigan office. Willis Stutson, of the Indianapolis district, is placed in charge of the Chicago office, with A. J. Brandt as assistant. Mr. Stutson will also handle the Indianapolis district from Chicago. O. L. Miller, formerly of the order department at the factory, replaces Mr. Voss at Cleveland. T. E. Hauser, formerly head of the order department, becomes assistant to the sales manager, while W. Paxton becomes head of the order department.

S. S. Bean, Winnipeg, Can., has accepted a position as sales manager of the Janesville Machine Co., Janesville, Wis.

Charles S. Slaker, sales manager of the Janesville Machine Co., Janesville, Wis., has resigned to become general sales manager of the Stover Engine & Mfg. Co., Freeport, Ill.

J. S. Norris has been appointed sales representative of the Cincinnati Screw Co., Cincinnati, and will have offices at Sixth and Walnut streets, Cincinnati.

J. F. Lyon has been placed in charge of the Pittsburgh office of the Browne & Sharpe Mfg. Co., Providence, R. I. This company has opened offices in the Oliver building.

Arthur L. Lewis has been appointed superintendent of Sleeper & Hartley, Worcester, Mass. Mr. Lewis was formerly connected with L. F. Fales, Walpole, Mass.

L. G. Wallis has been appointed engineer of construction of the Jacksonville Terminal Co., Jacksonville, Fla., and will be in charge of the erection of a $1,000,000 union station at that point.

The Brown Instrument Co., Philadelphia, has recently opened a Detroit branch office in the chamber of commerce building. The office will be in charge of William Printz, formerly assistant sales manager.

Albert V. Broillette, who has been associated with the Remington Arms-Union Metallic Cartridge Co., Ilion, N. Y., for some time, is now connected with the New England Westinghouse Co., Springfield, Mass.

It is reported that a company headed by C. H. Norton, president of the Western Machinery Co., Cincinnati, has purchased the plant of the Shepard Lathe Co., Cincinnati, and that the output of the plant will be materially increased.

Carl N. Richardson has resigned his position as foreman of the barrel department of the Remington Arms-Union Metallic Cartridge Co., Ilion, N. Y., and has accepted a position as toolroom foreman with the Champion Ignition Co., Flint, Mich.

A. W. Foote, president of the Foote-Burt Co., Cleveland, builder of drilling machinery, has been elected president of the H. A. Lozier Co., automobile builder, Cleveland. Mr. Foote succeeds H. A. Lozier, who continues as a director of the company.

Frank L. Herzog, recently chief engineer of the Philadelphia Roll & Machine Co., Philadelphia, has become associated with Mackintosh, Hemphill & Co., Pittsburgh. L. F. Uthe has resigned from the Garrett-Cromwell Engineering Co., Cleveland, to take the position vacated by Mr. Herzog.

Franklin G. Hubbard, for a number of years connected with the engineering department of the Western Electric Co.'s plant, Hawthorne, Ill., has resigned to become associated with the H. E. Harris Engineering Co., Bridgeport, Conn. The latter company is a designer and builder of special machines, dies and tools. Mr. Hubbard has been elected vice president of this concern and will be in direct charge of all plant operations.

Will H. Baltzell has been appointed chief engineer of the Canadian Steel Corporation, Ltd., Ojibway, Ont., Can.

Clayton L. Sonen, for the past two years superintendent of the Heald Machine Co., Worcester, Mass., has resigned to accept a similar position in a large factory in Detroit. The 300 employes of the plant presented him a purse of gold and a testimonial before his departure.

Robert C. Clifford, who has been district sales manager for the United States Cast Iron Pipe & Foundry Co. for the past four years, in charge of the St. Louis and Kansas City offices of that company, is now associated with the Walter A. Zelnicker Supply Co. in St. Louis, Mo., in charge of the rail department.

R. T. Cloyes, formerly associated with the Willys-Overland Co., in its Cleveland sales office, has accepted the position of sales manager of the Lees-Bradner Co., Cleveland. Previous to his connection with the Overland company, Mr. Cloyes was in the sales department of the National Lamp Works of the General Electric Co.

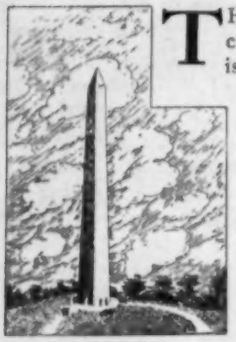
R. W. Cameron & Co., New York City, who maintain a staff of engineers in Australia and New Zealand in connection with their export business, have recalled R. W. Nicholls, of the Australian staff. It is said that this change was necessary in order to cope with the increasing activity in the machine tool and railroad supply business.

Richard F. Randolph, formerly general superintendent of the Saucon plant of the Bethlehem Steel Co., has been made general superintendent of the Dominion Iron & Steel Co., of Sidney, N. S. W. H. Bischoff, superintendent of No. 2 open hearth of the Bethlehem Steel Co., has resigned to become superintendent of coke ovens, blast furnaces and open hearth furnaces of the Dominion company. Mr. Bischoff has been continuously in the employment of the Bethlehem Steel Co. for 24 years. He was made superintendent of open hearth No. 1, March 23, 1907, and superintendent of open hearth No. 2, Jan. 1, 1913.

Business News of Nation's Capital

Report of Federal Trade Commission Will Discuss Iron and Steel Industries of Foreign Lands—Proposed Tariff Rates on Exports Suspended

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Oct. 2, 1916.



THE federal trade commission will issue in about two weeks two volumes of approximately 1,000 pages based on an investigation of financial, industrial and commercial conditions and systems in foreign countries. These countries will include Latin America, Australia, Africa, England, France, Germany, Italy, Belgium, and Russia the Orient. The report of the commission, it is understood, will be the most comprehensive of its kind that has ever been issued by the United States government. It is designed to point out to American interests not only the conditions of markets abroad and the policies of the various governments with regard to building up trade, but also to set forth the opportunities existing for expansion of American export trade, and the manner in which it may be brought about. The report is expected to carry legislative recommendations, among them an urgent request that congress enact at its earliest chance the Webb bill, legalizing export combinations. President Wilson has already announced that he will ask that the senate pass this measure soon after congress reassembles in December. The bill passed the house shortly before adjournment of the recent session of the sixty-fourth congress.

The commission report will devote much space to the iron and steel industry in large producing countries of Europe, and the encouragement given it by them. Machinery, machine tools and engineering supplies also will form a subject which will be discussed fully.

Conditions in South America were investigated by three representatives of the commission, D. L. Wing, W. P. Culbertson and R. E. Vorfeld. The latter two made a special study of South American customs tariffs and related legislative topics, and in connection with this work gave attention to market and competitive conditions, including those applying to iron and steel, machinery, machine tools and engineering supplies. Mr. Wing's investigation was devoted principally to opportunities existing in South America for American producers and the conditions that must be met, with suggestions as to the best manner of enlarging trade in South America.

Growth of Automobile Industry

Washington, Oct. 3.—The large expansion in industries engaged in the manufacture of automobiles and of automobile bodies and parts is shown in a preliminary report just issued by the bureau of census, setting forth a comparative summary for the years 1914 and 1909.

The figures follow:

	1914				
	Automobiles.	Automobile bodies and parts.	Total.	1909.	Per cent increase, 1909-14.
*Number of establishments	300	971	1,271	743	71.1
Persons engaged in manufacture:	91,997	53,954	145,951	85,359	71.0
Proprietors and firm members	60	700	760	405	87.7
Salaried employes	12,630	5,469	18,099	9,233	96.0
Wage earners (average number)	79,307	47,785	127,092	75,721	67.8
Primary horsepower	104,983	68,701	173,684	75,550	129.9
Capital	$312,876,000	$94,854,000	$407,730,000	$173,837,000	134.5
Services:	84,901,000	54,552,000	139,453,000	58,173,000	139.7
Salaries	17,966,000	19,560,000	37,526,000	9,479,000	295.9
Wages	66,935,000	34,992,000	101,927,000	48,694,000	109.3
Materials	292,598,000	63,610,000	356,208,000	131,646,000	170.6
Value of products	503,230,000	129,601,000	632,831,000	249,202,000	153.9
Value added by mfctr. (value of products less cost of materials	210,632,000	65,991,000	276,623,000	117,556,000	135.3

*In addition, in 1914, 33 establishments primarily engaged in other lines of manufacture, produced automobiles to the value of $6,636,920, and 434 establishments of this character manufactured automobile bodies and parts to the value of $10,515,070; in 1909, similar establishments produced automobiles valued at $830,080 and automobile bodies and parts valued at $4,415,266.

Rates Suspended

Washington, Oct. 3.—The interstate commerce commission made public an order entered Sept. 26, suspending from Oct. 1 and later dates until Jan. 29, the operation of tariffs proposed increased rates on structural iron and steel, and sheet steel for export from Chicago and Pittsburgh and other eastern points to the Pacific coast. The present rate on the articles involved, carloads, from Chicago, is 30c and the proposed rate 40c per 100 pounds. The present rate from Pittsburgh is 42c and the proposed rate 45c per 100 pounds.

Will Have Hearings

Washington, Oct. 3.—Hearings will be conducted by the interstate commerce commission as to the reasonableness or unreasonableness of tariffs filed by railroads proposing increased rates on iron and steel articles from central freight association and trunk line territories to Atlantic and Gulf ports for exports. The increases range from 30 to 75 per cent. The tariffs were filed to become effective on Oct. 1 and later dates. Protesting steel producers, principally from points west of Pittsburgh, appeared with railroad interests before the suspension board of the commission recently, when the former asked that the operation of the tariffs be suspended pending an investigation into the case.

Their plea was successful. The commission on last Friday made public an order suspending the operation of the tariffs until Jan. 29, pending which hearings will be held. The tariff schedules provide for the cancellation of export commodity rates on iron and steel articles and the substitution of prevailing domestic rates.

Show Patriotism

Washington, Oct. 3.—Acting Secretary of the Navy Franklin D. Roosevelt and bureau chiefs held a conference last Wednesday with private ship builders in connection with problems as to construction of the great number of vessels authorized in the new naval act. Plans of procedure with reference to bids to be opened on Oct. 25 were discussed in detail and particular emphasis was laid on the necessity of completing the ships within the time limit fixed by the department. Mr. Roosevelt, having been told by ship builders that expeditious construction depended chiefly upon the prompt delivery of manufacturing materials, said the department had taken up the subject with

steel and other producers and had been assured by them that precedence in delivery would be given ship building plants performing government work. Mr. Roosevelt expressed gratification at the attitude taken by the manufacturers and at the same time said it not only met the expectation of the department, but that it followed the patriotic policy in the past of the manufacturers toward the government. He said that the department does not want or expect to be given any advantages as to prices of steel and other products, but desires fair market prices, and had been promised they would be furnished. Steel, excepting armor plate, is bought directly for naval vessels by the private ship yards, when construction is done by the latter. Except for a few small vessels, all of the ships carried in the 1917 building program will be constructed by private builders.

Because private plants building vessels for the navy under contract are unable to obtain all the insurance desired on vessels nearly completed before being turned over to the navy department, some plan of protection from loss in case of accidents to the new ships is under consideration. Mr. Roosevelt said the department might decide to take over the care of such vessels in advance of their actual acceptance. Some of these vessels will cost as much as $18,000,000, and the insurance companies have declined to insure for more than $9,000,000.

They Object

Toronto, Oct. 2.—Strong exception is taken by many Canadian engineers and contractors to the employment of American engineers and the awarding of contracts for public works by the government to American firms. It is alleged that Canadians are being unfairly discriminated against. The Canadian Society of Civil Engineers has sent a letter of protest to the government in connection with the action of the commission of inquiry into the railway situation in appointing an American engineer as its advisor with instructions to organize a corps of engineers for valuation and advisory work.

Safe Practice at Blast Furnaces

The bureau of mines, department of the interior, has issued an exceedingly interesting manual entitled "Safe Practice at Blast Furnaces". This paper, which was prepared by Frederick H. Willcox, describes the dangers of the different kinds of work about blast furnaces and points out in an unusually thorough manner how the risk of accident may be lessened or avoided. The paper also contains suggestions to foremen, master mechanics and other officials on the method of organizing and conducting safety work. The paper covers 70 6 x 9-inch pages and includes 45 illustrations. The major portion of it will be published, with the illustrations, in forthcoming issues of *The Iron Trade Review*.

Death of S. P. S. Ellis

Samuel Powell Stackhouse Ellis, formerly assistant general manager of the Cambria Iron Co., Johnstown, Pa., died, Sept. 28, at his home in Pittsburgh, where he went about 27 years ago to become representative of the

S. P. S. ELLIS

Lorain Steel Co. He had been in poor health for a number of years. Mr. Ellis was born in Philadelphia in 1850. He is survived by two brothers, Harvey Ellis, of Philadelphia; Clifford J. Ellis, representative of the Cambria Steel Co. and allied interests at Chicago, and a sister, Mrs. Emley E. Wise, of Merchantville, N. J. He was a cousin of Powell Stackhouse, former president of the Cambria Steel Co.

Mr. Ellis went to Johnstown about 40 years ago to accept a position in the general offices of the Cambria company, and was made assistant general manager when the late Philip E. Chapin was appointed general manager to succeed Daniel J. Morrell. Mr. Ellis lived in Johnstown until about the time of the Johnstown flood. He represented the Lorain Steel Co. at Pittsburgh 23 years, resigning from that company on Feb. 1, 1912.

John B. Stillger, a superintendent for the E. W. Bliss Co., Brooklyn, died Sept. 27 at his home in Brooklyn, aged 45 years.

Julius Berbecker, president of the Berbecker & Rowland Mfg. Co., of Waterbury, Conn., and New York, manufacturer of metal working tools, died at Richmond Hill, L. I., Sept. 25, aged 83 years. He was also the head of Julius Berbecker & Son, New York, manufacturers of needles.

A. Bentley, Toledo, O., a leader in the contracting business of Toledo for many years, is dead. He was a native of Bradford, Eng., and came to America in 1870. He established himself in the contracting business in Toledo in 1876 and during the 40 years which have elapsed since then amassed a fortune. The Bentley concern built many of Toledo's public schools as well as many of the business blocks. A little more than a decade ago, the firm was incorporated under the name of the A. Bentley & Sons Co.

Will Make Cold Drawn Steel

A new Cleveland company, which will manufacture cold-drawn steel, was incorporated recently with $200,000 capital. The new concern, which will be known as the Drawn Steel Co., is the result of activity on the part of Jacob H. Worbs, who is identified with several of the leading industrial interests in Cleveland. A site for the new company has not been selected as yet, and it is possible that instead of erecting a plant an existing plant will be purchased. Plans for the operation of the company will be discussed at a meeting of the stockholders this week, at which time officers will be elected.

The old plant of the National Steel Foundry Co. at New Haven has been acquired by the Pennsylvania Seaboard Steel Corporation, Philadelphia, and is being rehabilitated for early operation. Only the open-hearth furnaces will be operated for the production of ingots and these will be shipped to other plants of the company for finishing.

A strike by about 30 employes of the Rockford Drop Forge Co., Rockford, Ill., last week was settled after the men had been out less than two days. The cause was said to be fear of a reduction in wages and desire for slight changes in working conditions.

Chemists Make Nation Independent

Discussion at Joint Convention of the Chemical Societies Shows That Articles Previously Imported Are Now Made in the United States— Products Exhibited in Grand Central Palace

HOW American ingenuity and technical skill under the press of necessity arising from the upsetting of commercial relations with Europe by the war, rose to the occasion and developed a chemical industry that bids fair to make the United States practically independent of the supplies of the outside world, was told by the papers and discussions and demonstrated by the extensive exhibits of manufactured products, presented at the annual joint convention of the American Chemical Society and of the American Electrochemical Society held in New York City the week of Sept. 23 to 30. The large part that the iron and steel industry is playing in this great development through furnishing the by-products of its coke works, was made clearly manifest. The meetings attracted a large attendance of scientists and an unusual interest from the general public indicating that the whole country is fully aroused to the importance of the work that its chemical engineers now are performing.

New Source of Nitrogen

An interesting paper presented before the American Chemical Society upon a subject which at present is of vital interest to the iron and steel interests was by H. C. Porter of the H. Koppers Co., Pittsburgh, on "Coal and Coke By-Products as a Source of Fixed Nitrogen." He showed the tremendous output of ammonia possible from the present by-product coke plants of the country and of the increase that will come from the promised further development of the coke industry. This will give the country an ample supply of ammonia both for the government needs of military nitrates in times of war and for the ordinary commercial uses including fertilizers. He pointed out for this reason, the utter waste in the proposed $20,000,000 government plant for the production of nitrates for war purposes and said this only would provide a competition with the present manufacturers and would tend to retard the development of adequate sources of the essential war explosives of toluol and benzol of which the by-product coking and gas industries are the country's only means of production.

An informal symposium on the subject of electric furnace steels and alloy steels with John A. Matthews, president of the Halcomb Steel Co., Syracuse, N. Y., presiding, was held Wednesday afternoon at the Grand Central Palace and was participated in by a number of steel works chemists and metallurgists and by representatives of large steel buyers. Mr. Matthews opened the discussion, showing a number of slides on the development of iron-making by the ancients, which were made from prints contained in old works in his personal library. He also showed a number of views which illustrated the development of the electric furnace from the original invention of William Siemens in 1878 down to the modern types. It was announced that the bureau of standards of the government was interested in receiving suggestions from steelmakers and metallurgists as to what fields of research in iron and steel metallurgy it might pursue at this time to be of best service. Dr. Jos. W. Richards, professor of metallurgy, Lehigh University, made some suggestions along this line relative to fusion and melting determinations and as to heat conductivity in solid and liquid form. Turning to the discussion of the electric furnace, Dr. Richards predicted that this method would continue to increase in tonnage until it rivaled the present leading processes. Alloy steels, he said, are the first natural field of the electric process and had been monopolizing the attention, but he believed there would be a gradual development in the future toward the commoner and milder metal of commercial use. He thought the time was coming when all steel would be put through the electric furnace before being cast, for by so doing a better quality than open hearth metal could be obtained at practically the same cost. He thought that any difference that might be found to exist today between alloy steels made in the crucible and in the electric furnace was due largely to the casting of small ingots in the former method. If small ingots were cast, he thought this problem would be solved to the advantage of the electric furnace. Mr. Matthews coincided in this view and said he did not consider metal in the crucible ready for pouring superior to electric steel. Dr. Richards stated all alloy steels made in crucibles are manufactured with equal facility in the electric furnace and Mr. Matthews added it was practically impossible to distinguish between high speed steels manufactured in the electric furnace and those made by the crucible process. In this connection, Mr. Matthews read a communication from K. W. Zimmerschied, metallurgist of the General Motor Co., Detroit, and a large buyer of steel, on the difference between open hearth and electric steel. Mr. Zimmerschied stated that electric steels, he had found, were freer of non-metallic inclusion, have a wider forging range and can be heated to a higher temperature before becoming cross-grained. Professor Tucker of Columbia University, stated that he had found that there was less loss in rare metals in the electric furnace than in the crucible. G. B. Waterhouse, metallurgist of Lackawanna Steel Co., made some inquiries about the use of acid lining in electric furnaces and Dr. Richards stated that silica lining now is being used to some extent. Chas. M. Johnson, metallurgist at the Park works, Pittsburgh, of the Crucible Steel Co. of America, gave some experiences as to the use of uranium in tool steel. He stated it had been found that this metal had the strongest affinity for oxygen of any of the group ordinarily alloyed with steel. The tests so far made on high-speed steels, he stated, had shown that carbon-vanadium-tungsten steel was 200 per cent better than uranium steel. A representative of the Colonial Steel Co. reported that 0.2 per cent of uranium had been used to take the place of 12 per cent of tungsten but that the steel did not retain its hardness after two grindings.

Discuss Electric Steel Practice

In connection with the discussions, references were made to the progress of installation and of the practice now being followed in the new electric steel plant of the Illinois Steel Co. at South Chicago which will be the largest in the world. It was stated that the second 15-ton furnace now is in operation. The old 15-ton furnace now is being run on the triplex process. When open hearth metal is available, this is desulphurized in the

electric furnace; when only bessemer is at hand, the dephosphorization and desulphurization both are done in the electric furnace. Because of the scarcity of magnesite, chrome brick for linings is being used in this installation. There was some discussion of the power requirements of the electric furnaces in which representatives of the Detroit Edison Co. took a leading part. Dr. Henry A. Howe, and other metallurgists present, made contributions to various phases of electric steel production during the afternoon's discussion.

Electroplating of Iron

At the Thursday morning session of the American Electrochemical Society, two papers of interest to the iron and steel industry were presented. These were "Protection of Iron by Electroplating" by O. P. Watts and P. L. De Verter and "Atmospheric Corrosion of Commercial Sheet Iron" by E. A. and L. T. Richardson.

A remarkable demonstration of what the American chemical industry has been able to accomplish in the diversification of production during the past two years, much of which has been in connection with the rapid extension of the recovery of by-products from coal and coke among iron and steel companies, was given by the national exposition of chemical industries, which was held at the Grand Central Palace in connection with the technical sessions of the chemical organizations. A wide variety of chemical products, many of which had not been manufactured in this country or only in a small way, before the war, were displayed. Ample evidence was presented that the American chemical industry had been stimulated to such an extent that its future on a broad scale was assured and that the United States was fast becoming independent of foreign sources of supply upon which it had relied for its requirements. In the booth of the American Electrochemical Society was displayed a complete automobile, the construction of every part of which was dependent upon the electro-chemical industry. The Tennessee Coal, Iron & Railroad Co. exhibited its by-products of the coke oven, blast furnace and steel works. The H. Koppers Co. showed the recovery of by-products in coke-making by the Koppers process and had on exhibit a miniature model of its oven. Other companies connected with the recovery of by-products from coal and coke which exhibited were the American Coal & By-Product Co., Chicago; the Barrett Co., New York; the Semet Solvay Co. and the Semet Process Co., Syracuse, N. Y.; the Benzol Products Co., New York, and others. There were many exhibits by manufacturers of equipment and supplies of an iron and steel character which are used in the chemical industry. The Buffalo Foundry & Machine Co. had a very extensive display demonstrating the value in such service of an acid-resisting iron. The Durion Castings Co., New York, had a similar exhibit. Among the other companies who occupied booths were the Bristol Co., Waterbury, Conn.; the Bethlehem Foundry & Machine Co., South Bethlehem, Pa.; the Carborundum Co., Niagara Falls; the Central Foundry Co., New York; the E. J. Codd Co., Baltimore; the Coatesville Boiler Works, Coatesville, Pa.; the De Laval Separator Co., New York; the Detroit Range Boiler Co., Detroit; the Driver-Harris Wire Co., Harrison, N. J.; the Elyria Enameled Products Co., Elyria, O.; the Foot Mineral Co., Philadelphia; the Fuller Engineering Co., Allentown; the General Electric Co.; the Glen Falls Machine Works, New York; S. F. Hayward & Co., New York; Herman A. Holz, New York; Kieselguhr Co. of America, New York; Leeds & Northrup Co., Philadelphia; the Lehigh Axle Works, New York; the Lehigh Foundry and the Lehigh Stoker Co., Fullerton, Pa.; the J. L. Mott Iron Works, New York; the Nash Engineering Co., South Norwalk, Conn.; the Norton Co., Worcester, Mass.; the Ruggles-Coles Engineering Co., New York; Taylor Instruments Co., New York; United States Cast Iron Pipe & Foundry Co.; Westinghouse Electric & Mfg. Co. and others.

Arsenal Additions

An appropriation of $767,600 is now available for improvements at the United States arsenal, Watertown, Mass., and M. T. Carney, purchasing agent is expected to take estimates after Jan. 1 for the necessary buildings and equipment. The largest project planned is additions to the plant to cost $500,000, which will include modern brick shop buildings, a 185-ton electric crane to cost about $50,000, machine tools, planers, boring mills and increasing the capacity of the power plant to be used for the manufacture of gun carriages. A brick projectile machine shop to cost $215,000 with equipment is also planned. An appropriation of $52,600 also has been made for placing a monitor roof on the brick, 1½-story, 70 x 200-foot smith shop and for repairs and equipment for the same.

Benzol Prices

Are More Clearly Defined—Toluol Market Chiefly for Spot.

New York, Oct. 3.—Both toluol and pure benzol have developed more definite business the past week, so that the unsettled situation on prices, particularly in the former product, is being cleared up. A fair amount of business was closed in benzol on contract, and there was some spot buying at prices from 60 to 65 cents per gallon. While resale offerings for spot around 60 cents have been taken up largely, some producers are willing to book business at that level. Toluol orders, chiefly, have been for spot, in which the manufacturers of trinitrotoluol have shown more interest. Spot now is from $3 to $3.25 per gallon. Buyers who offer $3 usually are being accommodated. On the contract side, prices are nominal around $3, because there is little buying of this kind. Some producers indicate they will shade that figure.

Phenol is strong and active, especially for spot. The sharp fluctuation in prices some months ago is causing buyers to take no chances in closing contracts, and they are ordering from hand to mouth. The makers also are not anxious to sell ahead, expecting higher prices. Consequently, there is a lively bidding for early shipment, and the market is free of offerings. Prices are higher at from 60 to 65 cents per pound, at which there were some good bookings during the past week. Some liberal orders are offered at 57 cents, but sellers are more indifferent to such bids. Contracts are nominal, with 65 cents probably the minimum. Solvent naphtha has been in larger demand and recent spot offerings are being absorbed. There also is some contracting. Prices are unchanged at 35 cents per gallon for spot and at 30 cents for contract.

Sulphate of ammonia again has advanced with spot and nearby now from $3.72 to $3.77, tidewater, per 100 pounds. Most of the going business is for spot, with producers having little to offer.

Market Prices for Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.

Pure benzol	$0.60 to .65
Toluol	3.00 to 3.25
Solvent naphtha	.35

Per Pound at Producers Plant.

Phenol	$0.60 to .65

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$3.72 to 3.77

Contract.

Per Gallon at Producers Plant.

Pure benzol	$0.60 to .65
Toluol	3.00
Solvent naphtha	.30

Per Pound at Producers Plant.

Phenol (nominal)	$0.65

Per 100 Pounds at Seaboard.

Sulphate of ammonia (nearby)	$3.72 to 3.77

Tool Market Remains Weak in East

Eastern Dealers Say Lathes Are Not Turning Over as Rapidly as Heretofore—Claim Foreign Business is Insignificant—Pittsburgh Dealers Busy While Cincinnati Entertains New Inquiries From Abroad

THE situation in the eastern machine tool market appears somewhat easier this week, and although a good miscellaneous demand is still in evidence, the volume of business placed was smaller. Domestic consumers again figured in the bulk of current sales, and as has been the case for the past several weeks, closed on orders involving from one to six machines. Dealers in lathes report the market for that particular machine as being practically at a standstill, with no prospects for any early resumption of activity in sight. The crane market also continues comparatively dull. Inquiry, however, is good, but owing principally to the sold-up conditions which prevail, orders remain small and scattered. The ever advancing tendency in prices has also checked the placing of considerable business. The ship builders, from whom further buying is expected at most any time, in view of the recent large naval appropriation by congress, have not as yet showed any marked intentions towards covering on their requirements. Foreign demand has slumped and it is not believed that any large sales are pending. Railroads, which appeared to be showing more interest last week, again have dropped almost entirely out of the market.

The Troy Engine & Machine Co. plans the erection of a $50,000 foundry at Troy, N. Y. The Connecticut Co., operating trolley lines in Connecticut, will erect a power plant at New Haven, Conn., which, with equipment, will cost about $250,000. The Eclipse Machine Co. is receiving bids on a machine shop and tool room addition to its plant at Elmira, N. Y. The Hamburg Planing Co., Hamburg, N. Y., will build a $20,000 mill. The Tate Radiator & Fender Co., Baltimore, has plans for alterations to its plant, costing $5,000. Charlotte Bros. have plans for a foundry at Blackstone, Mass. The Terre Haute Money Machine Co., Terre Haute, Ind., has started work on the erection of a $70,000 plant at Reading, Pa. The International Coupler Co. will build a $10,000 plant at Arcadia, Pa. P. J. Collins, Lansdowne, Pa., will build a $3,000 machine shop.

Chicago Market Dull

FEATURES are absent from the situation in the machine tool market in Chicago. No large inquiries are current, either domestic or export, and the business being done consists of single tools or small lots, accompanied by a steady demand on the part of all sorts of consumers. Some dealers find that foreign sales have practically ceased. Prices have not fluctuated, but it is rumored that further increases are imminent, as higher costs confront builders. Deliveries on some classes of equipment are much better, but on most standard lines deferred deliveries are quoted.

Steelmakers Aid Market

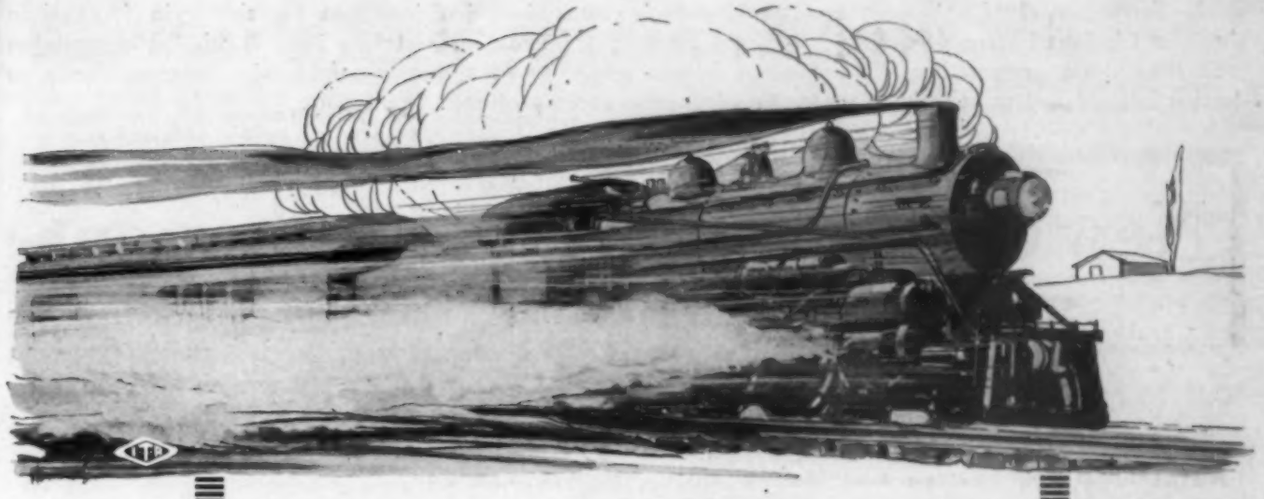
ADDITIONAL steelmaking capacity and extensions to finishing departments are contributing to increase the demand for machine tools and heavy rolling mill equipment in the Pittsburgh district. The Edgewater Steel Co. has taken over the Kennedy-Stroh properties at Oakmont, Pa., and has been buying equipment for making a diversified line of steel and brass products. The Pittsburgh Crucible Steel Co. continues to make extensions at its plant at Midland, Pa., having recently completed plans for an additional open-hearth steel furnace. The Trumbull Steel Co., Warren, O., as indicated in last week's issue of *The Iron Trade Review,* plans to erect a steel works, and already has entered into negotiations for necessary equipment. The Pennsylvania railroad, the Baltimore & Ohio railroad and the Pittsburgh & Lake Erie railroad have been buying a miscellaneous line of machine shop equipment, and virtually every manufacturer in western Pennsylvania is regarded as a prospect for some kind of machinery.

Cleveland Market Takes Brace

THERE is marked activity in the Cleveland machine tool market. Several large orders are pending for miscellaneous assortments of tools. The Alliance Machine Co., Alliance, O., is understood to have closed on a large inquiry for planers. It is reported that this business totaled about $76,000. The Barney & Smith Car Co., Dayton, O., has purchased extensively and it is believed that this concern is still in the market. The Park Drop Forge Co., Cleveland, is in the market for a 52 or 60-inch, double housing, 16 or 18-foot table, planer. There are several inquiries in the local market for milling machines and boring mills. The National Tube Co., Pittsburgh, has not yet closed on the list which was mentioned in the Sept. 28 issue of *The Iron Trade Review.*

Foreign Business Appears in Cincinnati

FOREIGN orders for machine tools are beginning to appear again in the Cincinnati territory. For several months Cincinnati machine tool builders have been showing a strong preference for domestic business, and since domestic sales have been unusually heavy, very few foreign orders were taken during June, July and August. From the present outlook, more foreign business will be taken in October than during any month since last May. Machinery sales concluded during September were not quite as heavy



AGATHON STEELS

Every part of an engine and its coaches or cars is under continual hard strains.

Ordinary steels cannot long withstand such treatment.

AGATHON STEELS have come to the rescue of manufacturers who are up against just such propositions — conditions where the utmost strength can be obtained without excessive weight.

AGATHON STEELS

are manufactured only for those who require *high grade steels.*
If you are a particular user,

"AGATHON" STEELS WILL SERVE YOUR PURPOSE BEST

OUR PRODUCTS:

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"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Special Analyses
"AGATHON" Vanadium
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CLEVELAND OFFICE—Hickox Building, The Hamill-Hickox Co., District Representative
CHICAGO OFFICE—Room 1511-12 Lytton Bldg., East Jackson Blvd.
A. Schaeffer, District Representative
PHILADELPHIA OFFICE—902 Widener Bldg. Frank Wallace, District Representative

Say you saw it in THE IRON TRADE REVIEW

as in September, 1915. A year ago machine tool shops in Cincinnati were producing 5 per cent more tools than at the present time. The decrease in production is attributed principally to the strike of union machinists that has been technically in force since the middle of October, 1915. This labor condition has forced a number of machine shops to break in green workmen continually.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

PORTLAND, ME.—The Wise-Logan Sales Co. has been incorporated to manufacture all kinds of industrial efficiency devices with $50,000 capital by Benjamin B. Sanderson, E. V. Mann and E. E. Huston.

STILLWATER, ME.—The steam sawmill and planing mill of the Stillwater Mfg. Co. were destroyed by fire with a loss of $60,000. The plant will be rebuilt.

BOSTON. — The United States Vaporizer Co. has been incorporated with $150,000 capital by Harvey J. Elms, George O. Olsen and Raymond H. Elms.

BOSTON.—The city of Boston will build a brick, 4-story, 65 x 110-foot municipal building to cost $100,000 at Shawmut avenue and West Brookline street.

GARDNER, MASS. — The Simplex Time Recorder Co. has awarded a contract for a concrete, mill-construction, 3-story, 60 x 100-foot factory to cost $30,000 at South Lincoln and Sanborn streets.

NEW BEDFORD, MASS.—The Passaic Cotton Mill Co., New York, will build a 2-story, 448-foot spinning and weaving mill.

SOMERVILLE, MASS.—The New England Blacking Co., Boston, has awarded a contract for a brick, 1-story, 80 x 130-foot factory on the boulevard, West Somerville.

WAKEFIELD, MASS.—The Morrison-Skinner Co. will build a 1-story, 100 x 150-foot factory and power plant on New Salem street.

WESTFIELD, MASS.—The Foster Machine Co. has been incorporated with $150,000 capital by Ralph W. Dunbar, John L. Newell, Henry C. Brookings, Felix Rockemann and Harrison M. Davis.

WORCESTER, MASS.—The Norton Co. has awarded a contract for a brick, 5-story, 44 x 138-foot building on New Bond street, to cost $110,000.

WORCESTER, MASS.—The Wyman & Gordon Co., Worcester, Cleveland and Detroit, has awarded a contract for a brick, 2-story and basement, 68 x 68-foot office building to cost $50,000 at Gold and Madison streets.

EAST PROVIDENCE, R. I.—The Phillipsdale Paper Mills will build a 2 and 3-story, 48 x 210-foot addition to its plant and a 40 x 150-foot wharf along the Pawtucket river.

PAWTUCKET, R. I. — The Blackstone Glazed Paper Co. has awarded a contract for a 1-story, 54 x 236-foot addition to its plant on North Bend street.

PROVIDENCE, R. I.—Crompton & Knowles Loom Works has awarded a contract for a brick and steel, 1-story, 23 x 41-foot addition at its plant at 241 Harris avenue.

PROVIDENCE, R. I.—The William Hughes Co., will add a brick, 1-story shop to its automobile plant on Dike street and a fireproof building on Bough street to cost $30,000.

PROVIDENCE, R. I. — The Narragansett Electric Lighting Co. has awarded a contract for a brick and steel, 3-story addition to its power house on Elm street.

PROVIDENCE, R. I.—The Providence Mfg. & Tool Co. has awarded a contract for a 2-story addition to its building at 17 Warren street.

PROVIDENCE, R. I.—The American Silk Spinning Co. has awarded contract for a brick, mill-construction, 2-story and basement, 83 x 140-foot manufacturing building on Admiral street, to cost $50,000.

PROVIDENCE, R. I.—The Rhode Island Hospital Trust Co. has awarded contract to the George A. Fuller Co., New York, for a brick, reinforced concrete and stone, 10-story, 160 x 200-foot addition at Westminster and Dyer streets, to cost $1,000,000.

SAYLESVILLE, R. I.—The Glenlyon Dye Works has awarded a contract for a brick and steel, 3-story, 82 x 70-foot addition with an ell, 20 x 21 feet, and a 9 x 120-foot bridge.

WOONSOCKET, R. I.—F. L. Clever will build a concrete, 2½-story, 75 x 75-foot manufacturing building on Worrall street, to cost $18,000.

WOONSOCKET, R. I. — The Fairmount Foundry Co. has been incorporated to manufacture iron and other metallic castings and machine tools with $35,000 capital by Matthew Sweeney, George E. Bouvier and Clifford Teachman.

NEW BRITAIN, CONN.—The Barnes & Kobert Co. will build a 1-story, 60 x 200-foot forge shop.

NEW HAVEN, CONN.—The Connecticut Co. has been granted a permit to build a fireproof, 2-story, 78 x 148-foot addition to its power house on Grand avenue to cost with equipment, about $250,000.

WATERBURY, CONN.—The R. N. Bassett Co., Derby, Conn., has bought the M. Heminway & Son Silk Co.'s property at Benedict and West Clay streets and will manufacture steel frames, locks, hinges, etc.

From the Alleghenies to the Sea

ALBANY, N. Y. — Automobile Crankshaft Corporation has been incorporated to manufacture automobiles, aeroplanes and tractors. The new company is capitalized at $325,000 by J. M. Hibbard, Detroit, E. E. McCrone, and W. C. Rice, 21 Second street, Troy, N. Y.

NEW YORK.—The American Can Co., 120 Broadway, has awarded the contract for a $1,000,000, 5-story plant at Seattle, to be completed the first of year.

NEW YORK.—The Parson Engineering Co. has been incorporated with $200,000 capital by W. A. Zimmerman, C. H. Hayes and R. H. Becker, Rockaway Beach, N. Y.

NEW YORK.—The Atlantic Metals & Alloys Co., ferro-alloys, alloy, steel, etc., has been incorporated with $20,000 capital by E. Rice, H. J. Dietrich and T. Schmueckle, 2027 Bathgate, Bronx, N. Y.

NEW YORK.—The Terminal Engineering Co., mechanical consulting engineer, has been incorporated with $50,000 capital by H. F. Thomson, Richard J. Dearborn and W. C. Brinton, 7 East Forty-second street.

BAYONNE, N. J.—The board of education will build two schools to cost $440,000 and $96,000, respectively.

JERSEY CITY, N. J.—Alexander Kaplen will erect a 4-story apartment house at Boulevard and Highland avenues, to cost $75,000.

KEARNEY, N. J.—The Universal Electric Co. has been incorporated to manufacture and sell electric motors, dynamos, etc. The new company is capitalized at $25,000 by Carl F. Westlin, Gustav O. Westlin and Frank Koch, Arlington.

NEWARK, N. J.—Joseph Hensler Brewing Co. has taken out a permit for two extensions to its bottling house at 192 Murray street to cost $10,000.

NEWARK, N. J.—The Positive Lock Washer Co., Vanderpool street and Avenue A, has plans drawn by H. J. and J. V. King, for a 2-story brick factory building, 58 x 74 feet, to cost $10,000.

OXFORD, N. J.—William A. Bartley, formerly connected with the William A. Bartley & Sons, Bartley, N. J., will organize and equip an iron foundry at Oxford.

PLAINFIELD, N. J.—The Plainfield common council has awarded a contract to the

P. J. Kenny Co., New York, for the construction of a municipal building. The contract price is $102,000.

SOUTH ORANGE, N. J.—The Foram Corporation has been incorporated to conduct an engineering and chemical works. The new company is capitalized at $75,000, by Clerence C. Campbell, William R. Baird, South Orange, and Stephen S. Newton, New York.

TRENTON, N. J.—B. F. Cesson, chief engineer of the board of commerce and navigation, has submitted plans for the proposed Bayonne terminal. The estimated cost range from $3,000,000 to $8,300,000. The first plan calls for wharfage for four ships, the second for docking facilities for 25 ships and the third for wharfage for 35 ships.

BLAIRSVILLE, PA.—The Blairsville Machine Co. has been incorporated with a capital of $5,000 to manufacture fans, ice machines and to operate a general machine shop. The incorporators are J. R. Robinsin, Mt. Lebanon, Pa.; L. H. Seidner, Bellevue, Pa.; M. R. Robinson and P. W. Robinson, Blairsville, O.

CARNEGIE, PA. — The Acme Stove & Range Co. has been incorporated with $15,000 capital by William A. Kleel, William Jones, Andrew Weisburg and H. Fred Mercer, Pittsburgh.

EAST PITTSBURGH, PA.—The Pennsylvania railroad plans to build a freight station to cost $50,000. Alexander C. Shand, Philadelphia, is the chief engineer.

EBENSBURG, PA. — Herman T. Jones, county auditor, has awarded a contract to the Portage Concrete & Construction Co., Portage, Pa., for constructing a 60-foot concrete, girder bridge over Little Conemaugh river to cost $5,140.

ELLWOOD CITY, PA. — The Lawrence Foundry Co. has been incorporated with $25,000 capital by R. R. Irwin, Evans City, Pa.; Wesley H. McChristy, Grove City, Pa.; and Charles Anderson, Elwood City.

GREENSBURG, PA.—Rinoute Galardi, Connellsville, Pa., has been awarded the contract for a steel plate bridge to cost $9,000.

GREENSBURG, PA.—John S. Sells, county controller, will receive bids for the construction of a reinforced concrete bridge over Little Puckety creek in Parranus borough, also one over Sewickly creek, Weltytown, Mt. Pleasant township.

INDIANA, PA.—Indiana county commissioners will receive bids until Oct. 1, for a reinforced concrete bridge over Lick creek. J. M. Marshall is chairman of the board.

JOHNSTOWN, PA.—The city council plans to issue $100,000 bonds for the construction of the Leuten bridge.

JOHNSTOWN, PA.—The Farris Engineering Co., Pittsburgh, has been awarded a contract for repairing several bridges at a cost of $41,500.

JOHNSTOWN, PA.—The Memorial hospital will erect a 5-story addition, 85 x 125 feet. W. R. Myton, First National Bank building, is the architect.

JOHNSTOWN, PA.—The city of Johnstown plans to build a reinforced concrete viaduct from the upper end of Maple avenue to the lower end of Conemaugh avenue to connect First and Chestnut streets.

OAKMONT, PA.—The Hall Concrete Products Co. plans to build a 3-story building, 125 x 300 feet. J. C. Norton, Lancaster avenue, Bryn Mawr, Pa., is the architect.

PHILADELPHIA. — The Austin Co. will erect a 1-story machine shop to cost $30,000 for the S. S. E. Motor Co. The building will be of structural steel.

PHILADELPHIA, PA.—The Crew Levick Petroleum Co., with plants in Western Pennsylvania, has been incorporated with a capital of $5,000. T. A. Wallace, New York, is treasurer of the company.

PITTSBURGH.—The National Biscuit Co., 409 Liberty avenue, plans to build a factory.

PITTSBURGH.—The Pressed Steel Car Co. will build a 1-story power house on Bison street.

PITTSBURGH.—The Aaron DeRoy Motor Car Co. will build a 4-story, reinforced concrete assembly plant and repair shop on Forbes street, to cost $80,000.

PITTSBURGH. — Ferguson & Edmonson, Keystone building, have received a contract for a trunk line for the Pennsylvania railroad in the Buffalo creek district, West Virginia.

PITTSBURGH.—The Kaufmann Bros., 24 West Grant avenue, have purchased a site at River avenue and Sturgiss street and plan to build an 8-story, fireproof warehouse, to cost about $1,000,000.

PITTSBURGH. — The Keystone Tire & Rubber Co., Keystone building, will build a new plant at Penn station along the Pennsylvania railroad. The plant will consist of a factory building, three stories, 60 x 190 feet and of brick and steel construction.

SHARON, PA.—A contract for the erection of a warehouse on Chestnut street has been awarded to Trautman & Christman by the Fruit-Ohl Co. The structure will be brick, two stories and 70 x 120 feet.

UNIONTOWN, PA.—Brook & Cornish have been awarded a contract for a bridge over Brown river.

DOVER, DEL.—The Crowther Motors Corporation has taken out a charter to manufacture motor cars and appliances. It is incorporated with $5,000,000 capital by F. R. Hansel, Philadelphia; George N. B. Martin and S. C. Seymour, of Dover.

DOVER, DEL.—The Electro-Pneumatic Gear Shaft Corporation has been incorporated with $100,000 capital, to manufacture and sell the MacPherson electric-pneumatic gear shaft and other auto devices. The incorporators are Jonathan H. Brown, William E. Brown and Edward Everett, all of Wilmington, Del.

WASHINGTON, D. C.—Sealed proposals will be received at the bureau of yards and docks, navy department, Washington, until Nov. 11, for furnishing a 50-ton, locomotive jib crane at the naval station, Pearl Harbor, Hawaii, according to schedule 3608; and for furnishing a 250-ton, revolving, floating crane for the naval yard, Mare Island, Cal., according to schedule 3597. Sealed proposals will be received until Oct. 28, for furnishing a 20-ton locomotive crane at the New York navy yard, New York, in accordance with schedule 3601.

Activities in the Central States

AKRON, O.—The American Hard Rubber Co. has been granted permits to build five factory buildings as follows: One to cost $37,000, another to cost $30,000 and three to cost $8,700 each.

ALLIANCE, O.—The Alliance Machine Co. will begin at once the erection of additions to its plant at Alliance. The work includes a steel and concrete erection house, 120 x 380 feet, a 2-story, 60 x 150-foot pattern shop, two 3-story, 50 x 250-foot pattern-storage buildings and a 50 x 150-foot blacksmith shop. The cost of the buildings is estimated at $500,000 and the equipment? is estimated at $300,000.

CINCINNATI. — Construction work has started on the plant of the French Bros.-Bauer Co. at Canal and Plum streets. The contract was awarded to the Ferro Concrete Construction Co. at $250,000 and the equipment to be installed will cost $250,000.

CINCINNATI.—Work on the new plant of the American Tool Works Co. at Pearl and Eggleston avenues is progressing rapidly. The plant will be 250 x 267 feet and five stories high. The cost including machinery will be $500,000.

CINCINNATI. — The Linde Air Products Co. is planning to erect a branch plant at Stanton avenue and Shillito street, Walnut Hills, to cost $50,000. Plans have been prepared for a building with one high story.

CLEVELAND.—The Sheer Bros. Fence & Iron Co., 715 East 103 street, contemplate the erection of a $100,000 plant.

CLEVELAND.—The Atlas Car & Mfg. Co. has applied for a permit to erect a $60,000 factory at 1132 Ivanhoe road.

CLEVELAND.—The Grant Lees Gear Co. has taken out a permit to build a p'ant addition to cost $30,000 at 2367 East Sixty-ninth street.

CLEVELAND. — The National Screw & Tack Co. has acquired a 45 x 143-foot site at East Seventy-second street and Sherman avenue on which to build plant additions.

CLEVELAND.—The International Machine Tool Co. has been incorporated with $15,000 capital by Harry T. Gettings, B. C. Brown, Emil W. Krytz, Victor C. Linch and N. L. McDonnell.

CLEVELAND. — The Masters & Mullen Construction Co. has contracts for two structures to be erected for the Peerless Motor Co., Quincy avenue and East Ninty-third street, at a cost of $125,000.

CLEVELAND.—The A. S. Gilman Printing Co., West Third street and St. Clair avenue, has acquired a new site on which will be erected a printing plant to cost $150,000. Plans are being prepared by the Forest City Engineering Co., Hippodrome building.

CLEVELAND.—The Thomas G. Sloane Co. has taken out a permit for the erection of a 6-story, reinforced concrete building on Prospect avenue to cost $200,000, for which plans are being prepared by the Grieble Engineering Co., Cuyahoga building.

CLEVELAND.—The Walther Engineering Co. has received a contract from the W. S. Ferguson Co., 1900 Euclid avenue, for the erection of a $120,000 building at East Seventy-first street and the Belt line for the Belt & Terminal Realty Co. The Ferguson company will soon award the contract for the $80,000 factory building for the Atlas Car & Mfg. Co. on Ivanhoe road.

CLEVELAND. — The Corner Realty Co. has taken a lease on a 100 x 165-foot site at East Ninth street and Chester avenue upon which will be erected a 16-story, fireproof, mercantile and theater building to cost $2,000,000.

CLEVELAND.—The Joseph Laronge Co., Williamson building, has negotiated the sale of the Mentor Knitting Mills' plant to a Cleveland syndicate. The plant comprises three buildings located on a 2-acre site and

will employ 350 people after improvements have been made.

CLEVELAND.—Ernest McGeorge, engineer, Leader-News building, has announced that a contract has been awarded to the Crowell-Lundoff-Little Co. for the erection of a $175,000 building for the Chandler Motor Car Co. at St. Clair avenue and East 131st street.

CLEVELAND.—According to H. D. Norvell, president of the City Ice Delivery Co. the company is contemplating the construction of three ice-manufacturing plants and eight storage plants. To accomplish this the stockholders will be asked to increase the capital of the company from $2,000,000 to $3,000,000.

CLEVELAND.—Permits were applied for by the board of education for a $181,000 school at 869 East 146th street; by the Peerless Motor Car Co. for a $45,000 plant at Quincy avenue and East Ninety-third street, and by the Cleveland Provision Co. for a storage and slaughter house to cost $75,000 at 3378 West Sixty-fifth street.

CLEVELAND.—The George A. Fuller Co. has been awarded a contract for remodeling the John Hartness Brown building at Euclid avenue and East Ninth street. The structure will be remodeled into a mercantile building, including a 6-story addition. The work will cost $400,000. George B. Post & Sons, Schofield building, are the architects.

CLEVELAND. — According to A. W. Thompson, vice president of the Baltimore & Ohio railroad, improvements will be made to the Cleveland terminal which include the erection of a high-level freight house on the site of the West Third street station and the elevation of the passenger station. Definite plans will be announced soon by R. N. Begien, chief engineer of the company.

DAYTON, O.—The Dayton Steel Wheel Co. has been incorporated by George Walther, J. Walther, K. Walther, W. A. Pierce and G. E. Nicholas at $50,000, to manufacture a patented steel wheel.

FINDLAY. — The Findlay Steel Castings Co. has been incorporated to manufacture steel castings by an electrical process. The company has been capitalized at $200,000 by E. T. Pelton, Harry Tilden and others.

LEBANON, O. — The Merchants Specialty Co., recently incorporated with $100,000 capital, will build a plant on South street. C. W. Civins, George O. March and Frank C. Anderson, of Lebanon, are members of the board of directors.

LIMA, O.—The Steiner Bros., manufacturers of tools, are planning to build a new factory at Haller and Haxter streets. The plant will be one story and 40 x 150 feet.

LIMA, O.—The Buckeye Machine Co. will build a new plant in North Lima to consist of machine shops and a foundry and will be constructed of brick and steel.

LIMA, O. — The Gramm-Bernstein Motor Truck Co. has been incorporated with $4,000,000 capital by B. A. Gramm, Max Bernstein, Digley Bernstein, S. S. Wheeler and H. O. Bentley. The company was formerly the Gramm Bernstein Co.

LORAIN, O.—The Standard Oil Co. will begin at once the erection of storage houses, tanks, etc., at a cost of $50,000 in which to store gasoline.

LORAIN, O.—The National Tube Co. is making improvements to its plant, including a new blooming mill, extensions to the open-hearth department and the blast furnaces. A contract for coke ovens has been let to the H. Koppers Co., Pittsburgh.

MARIETTA, O.—The Marietta Chain & Forging Co. has purchased a site on which to build a steel plant, 42 x 408 feet. B. F. Strecker, C. F. Sperry and W. P. Hastings are identified with the company.

MARIETTA, O. — The Obex Laboratories Co. has awarded a contract to Forman & Putnam for the construction of its plant near Marietta. The plant will include two 45 x 200-foot buildings to contain 20 tanks, 16 x 16 feet, and an extracting house, 45 x 120 feet.

MARION, O.—The Power Mfg. Co. is constructing the largest plant in the world for exclusive manufacture of crude-oil engines. The machine shop is 60 x 500 feet; a foundry is also being constructed.

MAYSVILLE, O.—The Standard Stamping Co. is contemplating the building of an addition to its plant which will be 200 x 200 feet, one-story high. Plans have not been prepared.

MIDDLETOWN, O.—The Ohio Gas & Electric Co. will build a transmission line from Cincinnati to Middletown at a cost of $90,000.

NEW PHILADELPHIA, O.—The machine shop, power plant and wheel room of the Dover Mfg. Co., Dover, O., were destroyed by fire with a loss of $125,000. Charles Johnson, general manager of the plant states that it will be rebuilt at once.

NORWALK, O. — The Norwalk Drilling Tool Co. has plans completed for the erection of a building to house a 5-ton hammer and another 125-horsepower boiler.

PIQUA, O.—The commissioners will issue $18,000 in bonds to cover the cost of a reinforced concrete bridge over the Stillwater river at Covington.

SALEM, O.—The Buckeye Engine Co. will erect an addition to its factory for which new machinery and other equipment will be provided. The new structure will be of reinforced concrete and steel, two stories and 120 x 380 feet. E. S. Grivets, Cleveland, is president of the company.

SANDUSKY, O.—The Gartland & Carroll Foundry Co. has been incorporated with $500,000 capital by J. J. Carroll, T. Gartland and others. The company is erecting a plant in the west end.

YOUNGSTOWN, O.—The National Self Cooling Machine Co. has been incorporated with $25,000 by W. B. Turner, J. H. Morris, G. Walter Sanborn, L. E. Taylor and J. W. Fortney.

YOUNGSTOWN, O.—The G. M. McKelvy Co. has taken out a permit for a 5-story, brick building to cost $100,000. The Truss Concrete Steel Co. has received permits for two 1-story reinforced concrete and steel buildings, 79 x 420 feet, costing $50,000 and 79 x 150 feet, costing $15,000, respectively.

HUNTINGTON, W. VA.—The Fulton Tool Co. has awarded a contract for a plant to H. Parsum, Huntington, W. Va.

MOUNDSVILLE, W. VA.—The Fostoria Glass Co. will build a 4-story building and mold room to cost $25,000.

NEW MARTINSVILLE, W. VA.—S. Myers, clerk of county court, will receive bids for constructing 12 bridges.

SISTERSVILLE, W. VA.—Work has been begun on the extensive improvements to the plant of the Ohio Valley Refining Co., at St. Mary's, O. Four new buildings will be erected to be used as a wax plant, filter house, a bone burner and a barrel house. The total cost of the project is estimated at $100,000.

WELCH, W. VA. — Ground has been broken for the new power plant of the Kentucky River Power Co. at Lothair, W. Va. The plant, which will cost $200,000, is in charge of L. E. Weisenberger, resident engineer in charge of construction.

FORT WAYNE, IND.—The county commissioners will have plans prepared at once for the construction of the State street bridge at a cost of $65,000.

FRANKFORT, IND.—The McDougall Kitchen Cabinet Co. will rebuild at once its plant recently destroyed by fire with a loss of $50,000.

GOSHEN, IND.—Plans are being prepared for a plant for the National Dairy Machine Co. to be 50 x 100 feet, one story and basement. Bids will be taken soon.

KOKOMO, IND.—The Pennsylvania railroad will build an office building and freight depot costing $100,000. S. W. Hodgin, Richmond, Ind., is architect and engineer.

KOKOMO, IND.—Plans are being prepared for a gray iron foundry building, 120 x 250 feet, one and one-half stories high, for the Kokomo Brass Works. The cost will be about $30,000.

LAPORTE, IND.—A heating and lighting plant to cost $10,000 will be built at Laporte in the near future. The dimensions will be 51 x 72 feet, one story. The auditor of Laporte county is taking bids.

MICHIGAN CITY, IND.—Michigan City has voted $10,000 for a heating system for the court house. E. G. Dunn is city engineer.

AURORA, ILL.—The Chicago, Burlington & Quincy Railroad Co. plans to build freight car shops at Aurora, costing $45,000. T. E. Calvert, 547 West Jackson boulevard, Chicago, is the chief engineer.

CHICAGO.—The Francis & Nygren Foundry Co. will build an addition to its core building, 31 x 51 feet.

CHICAGO.—The Linde Air Products Co. has bought a site at Thirty-seventh and Wall streets, and will build a plant costing $75,000.

CHICAGO.—The Sheffield Foundry Co., E. F. Zitzewicz, president, 2020 Herndon avenue, is taking bids on a 1-story addition to its foundry, 61 x 83 feet.

KANKAKEE, ILL.—The Bradley Foundry Co. has been incorporated with $5,000 capital by J. F. Cady, F. H. Seidel, O. Gommell and Edward Unruh.

MONTGOMERY, ILL.—The Montgomery Hydro-Electric Co. plans to develop hydro-electric power from the Fox river. H. A. Strauss, Harris Trust building, Chicago, is the consulting engineer.

DETROIT.—The Art Stove Co. will build a 1-story foundry addition, 26 x 97 feet, to cost $2,500.

DETROIT.—J. F. Belles, manufacturer of wire and iron work, Porter and Fourth streets, will build a 2-story factory, 130 x 460 feet.

DETROIT.—The Michigan Smelting & Refining Co., 1685 Joseph Campau avenue, will build a copper furnace building, 1-story, 60 x 150 feet, to cost $25,000.

DETROIT.—The Eizerman Pump Co. has been incorporated with $25,000 capital by Anna M. Spark, William H. and Mary A. Eizerman.

GRAND RAPIDS, MICH. — The Antrim Iron Co. has been reorganized. Thomas J. O'Brien is the president.

GRAND RAPIDS, MICH. — The National Brass Works will build a 1-story, brick power plant, 45 x 80 feet.

GRAND RAPIDS, MICH. — Hofstra & Son, contractors, are building a plant for the Ideal Foundry Co. at Bowery and Summer streets. The building will be two stories and basement, 40 x 100 feet and of reinforced concrete and brick.

LANSING, MICH. — The Graham Roller Bearing Co., a Pennsylvania corporation with

offices at Coudersport, Pa., was admitted to conduct its business in Michigan.

MONROE, MICH. — The Monroe Binder Board Co. is having plans prepared for a new factory to cost $400,000, including equipment.

MONROE, MICH.—G. H. Wood, general manager of the River Raisin Paper Co., has purchased a site on East Elm street upon which a large plant will be erected.

ST. JOSEPH, MICH.—The Michigan Malleable Mfg. Co. will begin the construction of a large machine shop in connection with its new plant at St. Joseph.

ASHLAND, WIS.—The Armour Packing Co., Chicago, has awarded the contract to Tomlinson & Egan, Ashland, for erecting a fireproof branch house and cold storage plant costing $40,000, at Ashland. It will be 60 x 80 feet, two stories and basement, and of fireproof construction.

CUMBERLAND, WIS. — The Cumberland Fruit Package Co. will erect a large factory addition, two stories, 32 x 105 feet, and equip it with new veneer saws and other machinery.

FOND DU LAC, WIS.—The Organ Blowing Engineering Co., automatic pipe organ operating units, is building a new plant on McWilliam street and expects to move there from its present factory at 12 West Second street. W. H. Fagan is secretary.

JANESVILLE, WIS.—A new plant will be erected during the fall by the George S. Parker Pen Co., one of the largest manufacturers of fountain pens in the country. Plans are now being prepared.

KENOSHA, WIS.—The Wisconsin Gas & Electric Co. will spend $250,000 improving its plant.

LACROSSE, WIS.—William Kittle, secretary, state board of normal regents, Madison, Wis., will take sealed bids until Oct. 10, for the erection of a 3-story building at the LaCrosse normal school, to cost about $110,000. The plans were prepared by Van Ryn & DeGelleke, architects, Caswell block, Milwaukee.

MADISON, WIS.—A new factory costing between $35,000 and $40,000 will be erected by the Capitol Culvert Co. in South Madison, to replace the plant which was destroyed by fire recently. G. L. Schneider is the president.

MANITOWOC, WIS.—The Aluminum Goods Mfg. Co., which is now completing work on a 5-story factory, warehouse and office building costing $100,000, has engaged Earl F. Miller, architect, to prepare plans for a brick and steel 3-story factory building on Franklin street, to cost between $65,000 and $75,000.

MARSHFIELD, WIS.—The Felker Bros. Mfg. Co., manufacturer of steel culverts and farm machinery, is building an addition, 42 x 80 feet, to its main shop and a welding and cutting shop.

MARSHFIELD, WIS.—The Felker Bros. Mfg. Co., manufacturers of farm machinery, steel culverts, etc., is erecting a 42 x 80-foot addition to its main shop, a new sheet steel storage house and a separate building for the new installation of oxy-acetylene welding and cutting apparatus.

MILWAUKEE.—The A. J. Linderman & Holverson Co. will build a 6-story addition, 102 x 118 feet.

MILWAUKEE. — The Foster Construction Co., Caswell block, has the general contract for the construction of a new foundry for the Steam Appliance Co., West Allis.

MILWAUKEE. — The Harvey Spring & Forging Co., manufacturer of automobile and vehicle springs and forgings, will build a 1-story addition, 100 x 190 feet.

MILWAUKEE.—The Industrial Controller Co., 886 Greenbush street, will build a 2-story addition, 60 x 125 feet. Henry C. Hengels is the architect.

MILWAUKEE.—The Steam Appliance Co., Milwaukee, has started work on a new foundry at its plant at Sixty-third avenue and Burnham street, West Allis, Wis. The new shop will be 50 x 62 feet.

MILWAUKEE.—The National Brake & Electric Co., Belleview place, Milwaukee, has awarded general contract to the Wisconsin Cement Construction Co., for the erection of a new storage building, 45 x 65 feet.

MILWAUKEE, WIS.—The Briggs & Stratton Co., automobile ignition specialties, Milwaukee, has work well under way on its new $100,000 plant at Hopkins street and Teutonia avenue. H. J. Esser is architect.

MILWAUKEE.—The Wellington Electric Co., has been organized with a capital stock of $25,000, by Henry F. Wellington, Lucas Kropfel and C. H. Juergens, to do a general manufacturing, repair and installation business.

MILWAUKEE.—The Kearney & Trecker Co., machine tools, has awarded contracts for the construction of a new smithing shop, 60 x 100 feet. Upon its completion, the present building will be razed to make room for further extensions of the machine shop facilities.

ORFORDVILLE, WIS. — The Orfordville Light & Power Co. is about to make improvements to increase capacity and is planning to install a 200-horsepower, diesel oil engine. A. E. Tomlin is the secretary.

SHEBOYGAN FALLS, WIS.—The Immel Construction Co., Fond du Lac, Wis., has taken the general contract for the erection of a new assembling shop, 119 x 119 feet, and a motor repair shop, 72 x 85 feet, for the Falls Motors Corporation, formerly the Falls Machine Co.

WASHBURN, WIS.—A large box manufacturing unit will be erected at once by the Dupont Powder Co. at its Barksdale plant near Washburn. About $25,000 will be invested in new buildings and equipment. F. T. Beers, general superintendent, is in charge of the project.

WEST ALLIS, WIS.—The common council has set Oct. 7 as the date for receiving preliminary plans for the proposed new, $100,000 school building.

WEST ALLIS, WIS. — The Kearney & Trecker Co., manufacturer of milling machines, has broken ground for a further addition, a blacksmith shop, 54 x 64 feet.

CARTHAGE, MO.—The Carthage Foundry & Machinery Works is building a foundry, one and two stories, 72 x 143 feet.

KANSAS CITY. — The Columbian Steel Tank Co. will build a factory, 48 x 130 feet. A. A. Kramer is president.

KANSAS CITY.—The Metzner Stove Repair Co., manufacturer of castings, will build a 2-story plant, 50 x 140 feet, to cost $40,000.

KANSAS CITY.—The National Machine Co., 914 Main street, is about to equip a plant to manufacture fence supports. Lewis Alverson is the manager.

SEDALIA, MO. — The construction of a municipal waterworks plant costing $350,000 is under consideration. J. L. Babcock is mayor.

ST. LOUIS.—The Sterns Tire & Tube Co. will build a 4-story, reinforced concrete plant, 120 x 200 feet, to cost $250,000.

ST. LOUIS.—The Robert Breil Machine & Tool Co. has been incorporated to manufacture, repair machinery, tools, etc. The new company is capitalized at $12,000 by Robert, Clara and Amanda Breil.

DES MOINES, IA.—The Des Moines City Railway Co. will rebuild its power station.

NORTH McGREGOR, IA.—The Chicago, Milwaukee & St. Paul railroad is planning to build a machine shop. C. F. Loewth, Chicago, is the chief engineer.

ROCK RAPIDS, IA.—The supervisors of Lyon county will soon let a contract for three, 100-foot, steel spans, three, 80-foot, steel spans, one 50-foot, one 60-foot and seven 32-foot steel spans. W. Wyckoff, Rock Rapids, is the county engineer.

AMOKA, MINN.—The Federal Cartridge & Machinery Co. will build the first unit of its plant, 1-story, 50 x 160 feet, to cost $20,000. The complete plant is estimated to cost $500,000.

HIBBING, MINN.—Plans are being prepared for a municipal power plant by the C. L. Pillsbury Co., Minneapolis, Minn.

HOFFMAN, MINN.—The village of Hoffman has voted $10,000 for a municipal electric lighting system and plant.

HUTCHINSON, MINN.—The Hutchinson Gas Co., care of the Gas & Electric Construction Co., will build a gas plant costing $30,000. E. E. Collins, 509 Northwestern Bank building, Minneapolis, is the president.

LANCASTER, MINN.—The city of Lancaster will build an electric light plant.

MINNEAPOLIS, MINN.—The Minneapolis Steel & Machinery Co. is building a tool room 50 x 150 feet, to cost $30,000.

MINNEAPOLIS. — The Keller Mfg. Co. will build a 2-story foundry. W. F. Keller, 1325 Quincy street, is manager.

MINNEAPOLIS.—The Minnesota Steel & Machinery Co. will build a 1-story forge shop, 45 x 80 feet.

ROCHESTER, MINN.—Improvements to the waterworks system, including the installation of two electrically operated centrifugal pumps, air lifts and compressors, are under consideration.

ST. PAUL, MINN.—The American Dump Car Co., 1004 Pioneer building, will build a plant estimated to cost $2,000,000.

ST. PAUL, MINN.—The American Dump Car Co., 1004 Pioneer building, is planning to build a new plant for the production of contractors' equipment and dump cars.

WABASH, MINN.—The Wabash Gas Co. will build a plant costing $30,000. D. A. Fredericks is the president.

WANDA, MINN. — R. Wheland has been granted a franchise for an electric light system.

WEST ST. PAUL, MINN.—Bonds for $40,000 have been voted for building a waterworks plant.

WEST ST. PAUL, MINN.—A contract will be let soon for a waterworks system to cost $40,000. J. F. Druar is the consulting engineer.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$22.50 to 23.00
Bessemer, Pittsburgh	23.45 to 23.95
Basic, Pittsburgh	20.45
Basic, eastern Pa.	20.00 to 20.50
Basic, Buffalo	19.00 to 19.50
Malleab'e, Pittsburgh	20.45 to 20.95
Malleable foundry, Chicago	19.00 to 19.50
Malleable foundry, Philade'phia	21.25 to 21.75
Malleable foundry, Buffalo	19.00
No. 1X foundry, Philadelphia	20.50 to 20.75
No. 2 foundry, Pittsburgh	20.45 to 20.95
No. 2 foundry, Cleveland	19.00
No. 2 foundry, Ironton	18.50 to 19.00
No. 2 foundry, Chicago	18.50 to 19.00
No. 2X foundry, Philadelphia	20.00 to 20.50
No. 2X foundry, N. J. tidewater	20.00 to 20.50
No. 2X foundry, Buffalo	19.00
No. 2 plain, Philadelphia	19.50 to 20 00
No. 2 plain, N. J. tidewater	19.50 to 20.00
No. 2 plain, Buffalo	19.00
No. 2 southern, Birmingham	14.50 to 15.50
No. 2 southern, Cincinnati	17.40 to 18.40
No. 2 southern, Chicago	18.00 to 19 00
No. 2 southern, Phila. delivery	18.50 to 19.50
No. 2 southern, Cleveland	18.50 to 19.00
No. 2 southern, New York docks	18.50 to 19.00
No. 2 southern, Boston docks	18.75 to 19.25
No. 2 south. interior, New Eng.	19.50 to 20.50
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X furnace	17.50
Virginia No. 2X, Philadelphia	19.75
Virginia, No. 2 X, Jersey City	20.50
Virginia 2X, Boston points	20.75
Gray forge, eastern Pa.	18.50 to 19.00
Gray forge, Pittsburgh	19 45
Gray forge, Birmingham	13.50
Silveries, 8 per cent, furnace	21.00 to 27.00
Silveries, 8 per cent, Chicago	29.50
Low phos Standard, Phila.	36.00 to 37.00
Low phos, Lebanon, Pa., furnace	31 00
Low phos., Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	21 00 to 22 00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bes., 51½ per cent, ton.	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	nominal
For'n non-Bess., 50 to 65 per cent	nominal

COKE

(At the ovens.)

Connellavi'le furnace	$3.50
Connellsville fur., contract	3.25
Connel'sville foundry, contract	3.50 to 3.75
Connellsville foundry	3.50 to 3.75
Wise county furnace, contract	3.00 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	3.00 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, prompt	$164
Ferro manganese, 80 per cent, seaboard, contract	164
Spiegel, 20 per cent, fur. early and last half	45.00
Ferro-silicon, 50 per cent, Phil.	83.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $30.00; 10 to 11 per cent, $31.00; 11 to 12 per cent, $32.00; 12 to 13 per cent, $33.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$48.00 to 50.00
Forging billets, Phila.	65.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	55.00 to 60.00
Bessemer billets, Youngstown	45.00 to 50.00
Bessemer billets, Pittsburgh	45.00 to 50.00
Open hearth billets, Pittsburgh.	45.00 to 50.00
Open hearth billets, Youngstown	45.00 to 50.00
Bess. sheet bars, Youngstown	45.00 to 50.00
Op. h'th sheet bars, Youngstown	45.00 to 50.00
Bess. sheet bars, Pittsburgh	45.00 to 50.00
Open hearth sheet bars, Pbgh.	45.00 to 50.00
Muck bars, Pittsburgh (nominal)	40.00 to 45.00

SKELP

Grooved steel skelp	2.60c
Sheared steel skelp	3.00c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh & Chgo.	$33.00
Stan. op-h'th rails, Pbg & Chgo.	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0 95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2 90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh.	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	2.70c
Structural shapes, Philadelphia	2.859c to 3.009c
Structural shapes, Chgo.	2.79c to 3.50c
Structural shapes, New York	2.769c to 3.019c
Tank plates, Chgo.	3.19c to 3.60c
Tank plates, Pittsburgh (con.)	3.00c
Tank Plates, Pittsburgh	3.25c to 4.00c
Tank plates, Philadelphia	3.159c to 4.159c
Tank plates, New York	3.169c to 4.169c
Bars, soft steel, Chicago	2.79c to 3.50c
Bars, soft steel, Pbgh.	2.60c
Bars, soft steel, New York	2.769c
Bars, soft steel, Philadelphia	2.759c
Hoops, carloads, Pittsburgh	3.00c
Bands, Pittsburgh	2.60c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c
Bar iron, Philadelphia	2.559c to 2.659c
Bar iron, Cleveland	2.55c
Bar iron, New York	2.569c to 2.669c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c

SHEETS AND TIN PLATE

(Differentials indicated below are not now being closely followed.)

Bessemer
BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.05c
Nos. 9 to 10 (base)	3.00c to 3.10c
Nos. 11 and 12	3.05c to 3.15c
Nos. 13 and 14	3.10c to 3.20c
Nos. 15 and 16	3.20c to 3.30c

Bessemer
BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.95c to 3.05c
Nos. 22 and 24	3.00c to 3.10c
Nos. 25 and 26	3.05c to 3.15c
No. 27	3.10c to 3.20c
No. 28 (base)	3.15c to 3.25c
No. 29	3.20c to 3.30c
No. 30	3.30c to 3.40c

Bessemer
GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.40c
No. 12	3.50c
Nos. 13 and 14	3.50c
Nos. 15 and 16	3.65c
Nos. 17 to 21	3.80c
Nos. 22 and 24	3.95c
Nos. 25 and 26	4.10c
No. 27	4.25c
No. 28 (base)	4.40c
No. 29	4.50c

No. 28, black, Chicago	3.19c to 3.29c
No. 28 galvanized, Chicago	4.59c
No. 10, blue annealed, Phila.	3.159c to 3.419c
No. 10, blue annealed, Chgo.	3.19c to 3 29c
Tin plate, 100 lb., coke base	$5.50 to 6.00

IRON AND STEEL PIPE

(Prices Adopted July 24, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	62	35½
½ in.	66	51½
¾ to 3 in.	69	55½
Lap weld:—		
2 in.	63	50½
2½ to 6 in.	66	53½
7 to 12 in.	63	49½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	51	24
⅜ in.	52	25
½ in.	56	38
¾ to 1½ in.	59	43
Lap weld:—		
1¼ in.	46	31
1½ in.	52	38
2 in.	53	39
2½ to 4 in.	55	42
4½ to 6 in.	55	42
7 to 12 in.	54	41

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	54
Iron, 3½ to 4½ inches, l. c. l.	44

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.60
Plain wire, jobbers', Pittsburgh	2.55
Galvanized wire, jobbers', Pbgh.	3.25
Polished staples, Pbgh.	2.75
Galvanized staples, Pbgh.	3.45
Barb wire, painted, jobbers' Pbgh.	2.75
Barb wire, galv., jobbers', Pbgh.	3.45

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50 and 5, cut threads, 40, 10 and 2½, larger or longer, 35 and 2½.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50, and 10; cut, 50; larger or longer, 40 and 5.

Cold pressed, semi-finished hexagon nuts, 60 and 5.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.70 off list; hot pressed hexagon blank or tapped, $2.70.

Cold pressed square, blank or tapped, $2.40 off; hexagon, blank or tapped, all sizes, $2.80.

RIVETS

Structural rivets, Pbgh	4.00c
Structural rivets, Chgo. delivery	4.00c
Boiler rivets, Pbgh	4.10c
Boiler rivets, Chgo. delivery	4.10c

Tinner's rivets, 45, 10 and 5 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	2.60c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$34.50 to 35.00
Six-inch and larger, Chicago	31.50 to 32.00
Six-inch Class B, New York	31.50
Four-inch Class B, New York	34.50
Four and six-inch Birmingham	28.00
Six-inch and larger, Birmingham	25.00

Leight weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.25c
Steel squares, 2-in. & ov., Cleve.	3.90c
Steel rounds, 2-in. & ov., Cleve.	3.90c
Steel bars, under 2 in., Cleveland	3.40c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c
Steel bars, New York	3.35c
Steel bars, St. Louis	3.30c
Steel bars, Cincinnati	3.35c to 3.90c
Steel bars, St. Paul	3.38c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.35c
Iron bars, Detroit	3.20c to 3.25c
Iron bars, St. Louis	3.20c to 3.25c
Iron bars, Cincinnati	3.35c to 3.90c
Iron bars, Philadelphia	3.25c
Iron bars, New York	3.35c
Shapes, Chicago	3.25c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.30c
Shapes, St. Paul	3.35c
Shapes, New York	3.35c
Shapes, Cleveland	3.40c
Shapes, Philadelphia	3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.35c to 3.50c
Plates, Chicago	3.75c
Plates, Detroit	3.75c to 4.00c
Plates, St. Louis	3.80c
Plates, St. Paul	3.85c
Plates, New York	4.00c to 4.50c
Plates, Cleveland	3.80c
Plates, Philadelphia	4.00c to 4.50c
No. 10 blue anl. sheets, Chicago	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chicago	3.35c
No. 28 black sheets, Cleveland	3.40c
No. 28 black sheets, Cincinnati	3.40c
No. 28 black sheets, Detroit	3.40c to 3.50c
No. 28 black sheets, St. Louis	3.40c to 3.50c
No. 28 black sheets, St. Paul	3.50c
No. 28 galv. sheets, Chicago	4.65c to 4.75c
No. 28 galv. sheets, Cleveland	4.40c to 4.75c
No. 28 galv. sheets, Cincinnati	4.50c to 5.00c
No. 28 galv. sheets, Detroit	5.00c
No. 28 galv. sheets, St. Louis	4.80c to 5.00c
Hoops, Cleveland	4.00c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—

Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$20.00 to 20.50
Angle bars, steel, St. Louis	15.75 to 16.00
Arch bars and transoms, Chgo.	21.50 to 22.00
Arch bars and transoms, St. L.	22.50 to 23.00
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	11.50 to 12.00
Boiler punchings, Chicago	13.50 to 14.00
Bundled sheet, Cincinnati	8.00 to 8.50
Busheling, No. 1, Chicago	14.00 to 14.50
Busheling No. 1, Cincinnati	10.50 to 11.00
Busheling, No. 1, Cleveland	13.50 to 14.00
Busheling, No. 1, St. Louis	14.25 to 14.75
Busheling, No. 2, Chicago	9.50 to 10.00
Cast borings, Chicago	7.25 to 7.75
Cast borings, Cincinnati	5.00 to 5.50
Cast borings, Cleveland	6.50 to 6.75
Cast borings, St. Louis	8.25 to 8.50
Cast, No. 1, Chicago	12.75 to 13.25
Cast, No. 1, Cincinnati	12.00 to 12.50
Cast, No. 1, Cleveland	13.50 to 13.75
Cast, No. 1, St. Louis	13.00 to 13.50

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	16.00 to 16.50
Iron axles, St. Louis	28.00 to 28.50
Iron axles, Cleve	28.00 to 29.00
Knuckles, coup., Chicago	15.75 to 16.25
Knuckles, coup., St. Louis	16.25 to 16.75
Locomotive tires, Chicago	22.50 to 23.00
Locomotive tires, St. Louis	23.50 to 24.00
Machine shop turnings, Chgo.	6.00 to 6.50
Machine shop turnings, Cleve.	5.25 to 5.75
Machine shop turn'gs, Cincinnati	5.50 to 6.00
Machine shop turnings, St. L.	7.25 to 7.50
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	11.75 to 12.00
Malleable, Cincinnati	8.75 to 9.25
Malleable railroad, Chicago	12.25 to 12.75
Malleable railroad, St. Louis	12.75 to 13.00
Pipes and flues, Cleveland	12.00 to 12.50
Pipes and flues, Chgo.	12.25 to 12.75
Pipes and flues, St. Louis	13.00 to 13.50
Railroad wrought, No. 1, Chgo.	17.00 to 17.50
Railroad wrought, No. 1, Cleve.	16.25 to 16.50
Railroad wrought, No. 1, St. L.	18.00 to 18.50
Railroad wrought, No. 1, Cinci.	13.50 to 14.00
Railroad wrought, No. 2, Chgo.	16.00 to 16.50
Railroad wrought, No. 2, St. L.	17.00 to 17.50
Shafting, St. Louis	21.50 to 22.00
Springs, Chicago	16.00 to 16.50
Steel car axles, St. Louis	33.50 to 34.00
Steel car axles, Chicago	32.00 to 33.00
Stove plate, Chicago	9.25 to 9.75
Stove plate, Cleveland	10.00
Stove plate, Buffalo	11.00 to 11.50
Stove plate, Cincinnati	8.75 to 9.25
Stove plates, St. Louis	10.75 to 11.00

(Gross tons.)

Axle turnings, Cleveland	$11.25 to 11.50
Busheling, No. 1, Buffalo	13.00 to 13.50
Busheling, No. 1, Pittsburgh	13.50 to 14.00
Busheling, No. 2, Buffalo	11.00 to 11.50
Bundled sheets, Pittsburgh	11.75 to 12.25
Bundled sheets, Cleveland	11.25 to 11.50
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels, (iron), Pittsburgh	14.00 to 14.50
Car wheels (steel), Pittsburgh	18.25 to 19.00
Car wheels, Chicago	12.00 to 12.50
Car wheels, eastern Pa.	15.50 to 16.00
Car wheels, Buffalo	13.00 to 13.50
Car wheels, New York	13.50 to 13.75
Car wheels, St. Louis	13.00 to 13.25
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	9.50 to 10.00
Cast borings, New York	7.00 to 7.50
Cast borings, eastern Pa.	9.50 to 10.00
Cast borings, Buffalo	7.50 to 7.75
Cast borings, Pittsburgh	8.50 to 9.00
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